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THE FOUNDATIONS OF NATIONAL PROSPERITY

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THE FOUNDATIONS OF NATIONAL PROSPERITY

STUDIES IN THE CONSERVATION OF PERMANENT NATIONAL RESOURCES

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PREFACE

The title page of this work emphasizes the thought that conservation is to be regarded as a treatment of the foundations of national prosperity. It deals with the permanent causes of the *Wealth of Nations*. The titanic war struggle in which we are engaged makes it important to emphasize the fact that in the treatment of conservation we are dealing with national preparedness both for war and peace. There is danger that in dealing with measures of preparedness we may direct our attention too exclusively to the needs of to-day and to-morrow, whereas nothing stands out more clearly as a result of our world war than the fact that preparedness must be a permanent, all-round condition; for otherwise our preparations may be in vain. While it is true that this book deals mainly with permanent conditions of prosperity and preparedness, it also has lessons for the immediate present.

Part I deals with the more general aspects of the subject, bringing it particularly into relation to economic theory. This Part terminates in a consideration of conservation policies, and it is shown that these are chiefly land policies. Land policies are becoming more pressing, and their importance has been stressed by the World War.

In Part II, Professor Hess discusses the relation of conservation to economic evolution and shows that each stage in economic evolution must have its own conservation policies. Two things become clear from Professor Hess's treatment of conservation: first, that we have been in-

clined to judge past policies over-hastily, and, in t
second place, that we must be prepared to change o
policies as evolutionary change takes place in our econom
life.

Part III deals with minerals which present peculi
problems in conservation. We have in the case of minera
to do with natural treasures created once for all. Wh
the supply is gone, no more is to be had. The situati
changes as the supply lessens. Professor Leith has spe
a great amount of time and research on the subject whi
he discusses, and the editor of this volume feels safe
asserting that no more authoritative presentation of t
subject can be found.

Part IV deals with the human resources, and it is
these that the natural resources exist. Part IV con
last and is the natural culmination of the three previ
Parts. Professor Carver deals in a most interesting a
suggestive way with human resources. His Part is cri
cal and should lead to a very careful examination of rem
dies for social evils, because he looks below the phenome
of the day to the permanent effects of our methods in de
ing with human beings. It may seem to some that
preaches a stern gospel, but we must admit that measu
that give temporary relief and lead in the end to softn
flabbiness and degeneration deserve only condemnation

It may be of interest to readers of this book to kn
that the four authors prepared papers on the subje
which are here discussed for the Second Pan Americ
Scientific Congress. It occurred to the editor that th
four papers supplemented each other and, if properly
panded, would make a harmonious whole. In the ti
that has elapsed since the meeting of the Congress in D
cember, 1915, the authors have put such time as they co

spare upon their respective parts with the result that the original material has been very greatly expanded, and it is hoped correspondingly improved.

RICHARD T. ELY,
Editor, Citizens' Library of Economics, Politics and Sociology.

October, 1917.

I—CONSERVATION AND ECONOMIC THEORY

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II—CONSERVATION AND ECONOMIC EVOLUTION

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III—CONSERVATION OF CERTAIN MINERAL RESOURCES

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IV—CONSERVATION OF HUMAN RESOURCES

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TABLE OF CONTENTS

PART I.—CONSERVATION AND ECONOMIC THEORY

By Richard T. Ely, Ph.D., LL.D.

Professor of Political Economy in the University of Wisconsin

Chapter I.—Conservation Defined and Described

PAGE

Conservation is considered briefly to show that it is first of all a problem of property-relations. Conservation defined 3

Conservation means three things: viz. (1) Maintenance so far as possible; (2) Improvement where possible; (3) Justice in distribution... 3

The elements in the definition of conservation considered. It means preservation 3

Public ownership of forests and also coöperation with private owners.. 4

Waste of soil by erosion 4

Conservation means improvement 5

Conservation in agriculture 5

The cycle of the elements 6

Conservation concerned primarily with production 6

Conservation takes cognizance of distribution and its aim in economic justice 6

Public control of water and of mineral treasures 7

Conservation includes two orders of inquiry. The first belongs to the natural sciences 7

Our second order of inquiry is economic and it is this order of inquiry which gives us our most difficult problems 8

Irrigation affords illustration 9

Litigation and other social costs are the result of a failure to establish satisfactory property-relations 9

But heretofore there has been a general failure to appreciate the significance of property-relations as a necessary foundation of conservation 9

The Reclamation Service in its management of irrigation. Projects wisely took account of property-relations 10

CHAPTER II.—CONSERVATION AND POLITICAL ECONOMY PAGE

Conservation long treated by economists especially in Germany, but under other names 11
The nature of the German universities such as to force upon them a realism favorable to a study of conservation 13
The German idea of the State favorable to conservation 13
American economists treated conservation in the eighties 14
Work of James and Patten 15
Publications of the American Economic Association 15
A new economic philosophy 15
The State the guardian of the permanent interests of society 16
The work of Chautauqua for conservation 16
Forestry lectures at the University of Wisconsin the first in the country 17

CHAPTER III.—CONSERVATION AND FORESTRY

Forestry especially emphasized in the lectures of Prof. Knies on *Applied Economics* in the last quarter of the nineteenth century, and in the United States conservation was first strongly emphasized in connection with forestry 1
Two reasons for this: first the rapid destruction of our forests; and the second that men trained in Germany were especially prominent among those who called attention to conservation in the United States 1
The memorial of the Association for the Advancement of Science in 1873 started the movements which led to a National Forestry Bureau . 2
Dr. Fernow's pioneer work 2
Arbor Day 2
The life of the nation 21
The destruction of natural resources is possible cause of the downfall of nations 21
Conservation antagonistic to former economic philosophy of laissez-faire 2
The State alone can safeguard adequately the interest of the future ... 2
Fernow's classification of natural resources 2

CHAPTER IV.—THE SERVICES OF EX-PRESIDENT ROOSEVELT, GIFFORD PINCHOT, PRESIDENT VAN HISE AND THEIR ASSOCIATES IN THE NEW CONSERVATION MOVEMENT

Foresters and economists prepared the way for the great conservation movement, led by President Roosevelt, Gifford Pinchot and President Van Hise 2
But the economists should be leaders in this movement 2

CHAPTER V.—ECONOMIC PRINCIPLES OF CONSERVATION

PAGE

Economic principles of conservation 27
What is waste? 27
Wasteful production 27
Inadequate land policies 29
Conservation often means intensive use 30
High price of land promotes good farming 30
In general somewhat more intensive farming would be profitable in the United States at present prices 31
Progress in the art of agriculture encourages better farming 32
High wages in general antagonistic to conservation 32
The conservation of human resources limits the conservation of natural resources 33
Conservation in general means a sacrifice of the present interests to future interests 33
Professor L. C. Gray's discussion of the relations of present and future as fundamental in conservation 34
Final analysis rests upon individual and social philosophy 34
Gray's classification 35
Conservation and the interest rate 36
Indispensable natural resources very limited in quantity a class by themselves where the interest rate has no influence 36
Van Hise's definition of conservation 36
Product per man vs. product per acre 37
Conservation reveals an antagonism between private and public interests 37
The disharmony between economic environment and the demands of conservation 38
Moral and intellectual education must furnish remedies 38
Civilization means regard for the future 39
Waste in consumption 39
Disproportionate consumption 40
Enlightened self-interest has a greater scope than was appreciated in the early days of the conservation movement 40
The social burdens of conservation should be socially borne 41
An ethical level of conservation may be established 42
Unregulated competition is destructive; "trust-busting" campaigns proceed from prejudice and ignorance 42
The principle of regularities in large numbers affords scope for social activity to promote conservation 42
Prohibition of waste sometimes leads to improved but not more expensive processes 43

PA

Private and public property
Grounds for passing from private to public property
The doctrine of the police power
The growth of the police power strengthens private property
Conservation means better government

Chapter VI.—Conservation Policies

Conservation deals with A. human, and B. natural resources
A. Human Resources
Education
Health
Care for health a public concern
Engel's opinion
Contagious diseases controlled by public authority
The University Clinic at Wisconsin
Preventive medicine
Need of moral education
Social insurance
B. Conservation of natural resources
Land policies
Classification of land
Quality classes of land based on survey
Framework of an American land policy
The freehold
Tenancy
The State as landlord
Military defense
Public ownership of forests
Seizure of mineral resources
American conception of private property too expansive
Taxation of various strata of land
Great degree of harmony between private and public interest, yet social control necessary
Water publicly owned with private beneficial use
Strategic shore lands
Waste in urban land policies
Results of laissez-faire
Unsuccessful colonies in California
Settlers unable to purchase their farms
Successful experience in other countries
Causes of failure in our colonization

PAGE
Homes for laborers and farmers 65
Government must take initiative 66
Credit system 66
California should transform its methods and avoid alien land tenantry 66
The lesson of the European war 67
Higher political organization necessary 68
The power of legislation very limited. Its scope considered. Administrative Commissions alone equal to the tasks of conservation 68

PART II.—CONSERVATION AND ECONOMIC EVOLUTION

By Ralph H. Hess, Ph.D.

Associate Professor of Political Economy in the University of Wisconsin

Chapter I.—Conservation in its Relation to Industrial Evolution

Production is the basis of prosperity 95
The changing factors of production 95
Economic stages are marked by a changing ratio of natural resources to population 95
Changing economic conditions cause change in the relative importance of factors of production 96
The significance of industrial power in the definition of conservation ... 96
Social and political expediency require recognition 97
Social philosophy and social value 97
Circumstances limiting the possibilities of conservation 98
Physical and psychic facts contribute to industrial evolution 98
Study of economic conditions and machinery of social control a prerequisite of conservation program 99
The four stages of industrialization 99
The order of industrial change from frontier to maturity 100
The characteristics of the stage of exploitation 100
Exploitation is a legitimate practice in initial industrial periods 101
Exploitation and speculation 101
Destruction of latent social values the chief fault of exploitation 102
The characteristics of the developmental stage of industry 102
The deficit of industrial development 102
The necessity of a surplus to enable development 103
Development made possible by exploitation 103
The importance of organization and permanence 104

PAGE

Summary ... 1
The characteristics of the stage of industrial maturity ... 1
Industrial maturity implies permanent self-sufficiency ... 1
The characteristics of industrial regression ... 1
Some causes of regression ... 1
Industrial stages overlap ... 1
Future conditions are uncertain and economic policy speculative ... 1
Rational social policy and the changing order ... 1
A surfeit of population results in exploitation of human resources ... 1
The compensatory nature of factors of production ... 1
Changing conditions require reorganization ... 1
The reversing industrial values of human resources and natural resources ... 1
"Waste" is a relative term ... 1
Summary ... 1
Conservation must be in accord with economic opportunity ... 1
Social value and productive power ... 1
Teachings of Malthus and Ricardo are fundamental in economic theory ... 1
The teachings of Raymond and List ... 1
Industrial capacity, not wealth, is the basis of economic well-being ... 1
Some hypotheses of conservation ... 1
Natural resources but one of three factors of production ... 1
Necessary payment of wages and interest ... 1
Capital is converted natural resources and labor ... 1
Private economics versus public economies ... 1
Conservation costs are private and present: conservation benefits are social and future ... 1
A paradox of political economy ... 1
Public authority and the use of property ... 1

CHAPTER II.—THE POSSIBILITIES OF CONSERVATION WITHIN THE DIFFERENT STAGES OF INDUSTRIAL EVOLUTION

The classification of natural resources ... 1
Conservation during the period of exploitation ... 1
The economic teachings of Adam Smith and John Stuart Mill ... 1
American economic policies are fitted to frontier conditions ... 1
The restraint of destruction of and speculation in future values ... 1
Conservation during the period of industrial development ... 1
Industrial perpetuity versus transient productivity ... 1
The exercise of public authority is necessary to secure socially expedient development in extractive industries ... 1
Conservation during the period of industrial maturity ... 1

PAGE
Maintenance, restoration and substitution the final measures of physical conservation 121
Conservation of capital and man-power requires attention 121
Conservation under conditions of industrial regression 121
Reclamation of impaired resources 122
Impairment of resources may necessitate abandonment 122
The expense of reclamation usually falls upon government 122
Over-population necessitates migration, internal expansion, or aggrandizement 123
Maldistribution of wealth is an obstacle to conservation 124
Summary 125

CHAPTER III.—CONSERVATION AND THE THEORY OF INVESTMENT

Commercial values, pecuniary conditions, and flight of time are primary personal considerations 126
Industrial capacity is not identical with commercial value 127
Scarcity may be a cause of private gain 127
The analogy of conservation to investment 128
Gratification versus saving 128
The percentage excess of present desirability 129
Conservation and the interest rate 129
The three stages of capitalization 130
The three pecuniary steps in conservation 130
Reasons for saving and investment—the interest rate is dominant 131
A conservation increment may be analogous to the interest rate 131
The amalgamation of capital and natural wealth in industrial development 132
The physical limits of natural wealth are in contrast with capital increase 133
Natural monopolies versus capital monopoly 133
Private saving and investment are a voluntary choosing of future values 133
Much wealth in natural resources is immune to the interest rate 134
Some peculiar aspects of conservation investments 134
Compound interest applies to conservation finance 134
The futurity of conservation investment is important 135
The minimum conservation increment compatible with private economics 135
Conservation and personal expectation of survival 136
Conservation accruals illustrated 136
Fifteen years the normal time of a 10–5 per cent conservation project .. 137
Uncertainty of personal life tenure may reduce normal term to twelve years 137
Thirty years the normal term of a 20 and 5 per cent conservation project 139

CHAPTER IV.—THE RELATION OF PROPERTY RIGHTS AND PRIVATE INITIATIVE TO CONSERVATION

PAGE

Most natural resources of the United States are privately owned..... 140
The private short-time view versus the public long-time view..... 141
Time-preference for present goods has no place in public policy..... 141
Individuals must be compensated for chancing *risks* of the future..... 141
Enlightened self-interest may aid conservation..... 142
Experts may advise resource owners..... 142
American corporations are experimenting with "conservation."..... 142
High prices and large profits result from saving of some resources..... 143
Symptoms of monopoly..... 144
Laissez-faire is inadequate..... 144
Good business may parallel social welfare..... 144
The test of compatibility of private and public interests..... 145
Private advantages of conservation may be taught..... 145
Adequate developmental capital reduces exploitation..... 145
Certainty and integrity should be substituted for speculation..... 146
Uniform interest rates would aid conservation..... 146
Two principles of conservation finance..... 147
The necessity of credit and the competition of other forms of enterprise 147
The commercial borrower has convertible assets..... 148
Definitely timed industrial projects may have good credit..... 148
Resources subject to conservation are not "good security"..... 148
Existing funding institutions are not adapted to the needs of conservation 148
Inadequate financial support has necessitated government aid in reclamation..... 149
Credit practice and credit law are unscientific..... 149
Conservation a neglected field of financial opportunity..... 150
Recent banking legislation will aid conservation..... 150
Official supervision is a necessary sanction of developmental credit..... 150
The public spirit of individuals advances conservation..... 151
Civic responsibility a neglected educational task..... 151
The abstinence of conservation discommodes individuals in the use of their property and income..... 151
The technical advantage of the corporation over the individual conservationist..... 152
Succession..... 152
Convertible assets..... 152
Finance..... 152
Large-scale operation..... 152
Possible monopoly..... 152
Expert management..... 153

PAGE
"Corporation economics" occupies a middle ground between private economics and public economics 153
Certain disabilities of individual industrial management are removed by corporation management 153
Corporation management may improve outlook for conservation 154
The limits and results of corporate power are uncertain 154
Corporations serve public interests as an expedient to private motives 155
Natural resources provide opportunity for monopoly 155
Monopoly may restrict output and exact high prices 155
Monopoly-conservation causes exploitation of the market 156
Exploitation of markets weakens economic structure 156
The test of counterfeit conservation by monopoly 156
The corporation is peculiarly fitted to the development of natural monopoly 157
Corporation policy may jeopardize public interests in management of resources 157
The hoarding of natural resources 158
The "unearned increment" 158
Speculation in water-power sites 159
Some essentials of conservation policy 159
Education 159
Credit 160
Social consciousness 160
Corporation management 160
Limitations upon above agencies 160
The final necessity of restriction of private property 161

Chapter V.—Public Policy and Conservation

Conservation is a government function 162
The individual impulse is inadequate and ineffectual 162
Government is social control in behalf of collective safety and prosperity 163
The necessity of public authority 163
Individuals must tolerate regulation 164
Democratic government reflects needs and qualities of citizens 164
Government by restriction, direction, and stimulation 164
Necessary abandonment of obsolete dogmas 164
No detailed program should be formulated 165
Different methods may be equally effective 165
The suggestions of Ely, Roosevelt, and Van Hise 166
Foreign experience and conditions are suggestive 166
The meaning of regulation 167

PAGE

Two principles of regulative method—enlightenment and compulsion.. 167
Four loci of conservation control.... 168
The necessity of resource classification.... 168
Basis of classification.... 169
Some resources should remain in the public domain.... 169
Reasonable use as a condition of ownership.... 170
A western illustration—mineral and irrigation rights.... 170
The Colorado doctrine.... 171
Privately owned resources a public trust.... 171
Enlightenment as a conservation force.... 171
The police power and conservation.... 172
The public interest in sources of social necessities.... 172
Potential aspects of the police power.... 173
Taxation as a conservation tool.... 173
The "tonnage" tax.... 173
Tax exemptions may benefit.... 174
The "resource" tax.... 174
When private property should be returned to public ownership.... 175
Manner of transfer.... 175
Valuation by commission versus eminent domain.... 175
Principles of fair value.... 176
The relation of future needs to "public purpose" and "fair value".... 176
Public purchase by amortization.... 176
Unearned increments, donations and reinvested surplus.... 177
Possibility of accumulating public equity.... 177
Conservation finance.... 178
Two considerations—importance and financial ability.... 178
Effective administrative machinery now at hand.... 179
A federal board is needed.... 179
The correlation of existing agencies the main essential.... 179
Relation of cost of government to industrial opportunity.... 180
European experience.... 180
Theory of interest does not apply to public investment.... 180
Three principles of interest.... 181
Taxation may accumulate new capital.... 181
Taxation may induce thrift.... 181
The personal risk of futurity does not apply to society.... 182
No technical superiority of present social goods over future social goods. 182
Public investments need not pay dividends.... 182
Welfare versus wealth in national economy.... 182
The "business" view becomes inadequate in national defense and economic protection of the future.... 183

PAGE
The financial basis of economic power and national prosperity..... 183
Application of principles of public finance removes chief obstacles to conservation..... 184
The final canon of conservation..... 184

PART III.—CONSERVATION OF CERTAIN MINERAL RESOURCES

By Charles K. Leith, Ph.D.

Professor of Geology in the University of Wisconsin

Chapter I.—Introductory Statement

Basis and nature of the demand for conservation of mineral resources.. 187
Nature of the demand for conservation..... 187
The economist's part in the conservation movement..... 188
Scope of the present discussion..... 188
Present discussion to be confined to coal, iron and copper as illustrative of mineral resources..... 188
Conservation measures based on self-interest..... 189
Possibility of important conservation practice within the field of private ownership should be more clear..... 190

Chapter II.—Conservation of Coal

Reserves of coal in the United States..... 191
Revision of coal estimates largely increases reserves..... 192
Life of coal reserves..... 193
Limitation of coal reserves as a reason for conservation..... 193
Measures introduced or proposed to conserve coal..... 194
Source of proposals for conservation of coal..... 194
Recommendations for conservation of coal..... 195
(A) Mining and preparation of coal..... 195
Conservational proposals for mining and preparation of coal..... 197
Advances already made by application of above methods..... 198
Conservational advances already made in mining and preparation of coal..... 199
(B) Improvement of labor and living conditions at the mines..... 200
Conservational measures as yet introduced have involved little conflict of private and public interest..... 201

PAGE

(C) Introduction or modification of laws to remove certain restrictions on efficient methods of mining 201
Over-production and over-development of coal 202
Permission to coöperate as an immediately effective step in conservation 202
Common selling agencies 203
Reduction of excessive royalties on coal 203
Increase in price of coal as a conservation measure 204
Export tax on coal 204
Government ownership of coal 204
(D) Transportation of coal 204
(E) Utilization of coal 205
(F) Substitutes for coal as a source of power 206
Division of responsibility between government and private interests in the conservation of coal 206
The delimitation of fields of public and private endeavor in the conservation of coal 207
Self-interest requires conservation of coal 207
Interest rate as a limiting factor in conservation measures introduced for self-interest 208
Conservation measures in the coal industry possible only by government activity 208
Military considerations may accelerate application of government power 208
Permission for coöperation an immediately desirable step 209

CHAPTER III.—CONSERVATION OF IRON ORE

Reserves of iron ore in the United States 210
Large potential reserves of iron ore 210
Use of low-grade ores will indefinitely increase reserves 211
Life of iron ore reserves 200 years or more 212
Limitation of iron ore reserves as an argument for conservation 212
Conservation measures which have been proposed or introduced for the conservation of iron ore 212
Improvement in percentage of extraction in mining 213
Fee owners require clean mining of iron ores 213
Conservation of low-grade ores 213
Mixing of low-grade with high-grade iron ores 214
Saving low-grade iron ores by stockpiling 214
Division of control between fee owner and operator as a factor in the conservation of low-grade iron ores 215
Illustration of conflict between fee owners and operators in conservation of low-grade iron ores 216
Introduction of processes of beneficiation for low-grade ores 216

PAGE
Limited application of processes of beneficiation of low-grade iron ores.. 217
Conservational effect of concentration of ownership in larger units.... 218
Kinds of conservational practice possible to large companies..... 219
Monopoly not yet reached in iron industry..... 220
Conservation of labor and social welfare..... 220
Welfare movements prompted by self-interest..... 222
Important government aid in welfare movements..... 222
Improvement of efficiency..... 223
Conservational effect of changes in utilization and distribution of products..... 223
Saving of by-products in iron smelting..... 223
Measures for the conservation of iron ore, not yet inaugurated by private interests, but possible for the government..... 224
Elimination of resource cost..... 224
Restriction on over-capitalization, elimination of wasteful competition, and over-development, modification of laws permitting the larger concentration of control in a few hands..... 224
An immediately practicable step in conservation..... 224
Compulsory requirement of certain practices of mining or utilization.. 225
Arbitrary increase of prices to the consumer..... 225
Government ownership..... 225
Military considerations..... 226
Conclusion..... 226

Chapter IV.—Conservation of Copper

Reserves of copper ore in the United States..... 227
Increase of copper reserves..... 227
Methods of conservation of copper ores..... 229
Conservational practices made possible by concentration of control in copper industry..... 230
Improvements of metallurgical practice..... 230
No conflict between public and private interest in conservational measures for copper of type already introduced..... 231
Other conservational measures for copper ores, possible only by application of public power..... 232

Chapter V.—Division of Responsibility Between Private and Government Ownership in Conservation of Mineral Resources

Existence of private and public fields of activity..... 233
All conservational measures do not necessarily require individual sacrifice..... 233

PAGE

Public service nature of big business....235
Interest rate as a limiting factor in conservation by private interests.. 235
Illustrative example of application of interest rate to conservation problems.... 236
The interest problem stated.... 236
Future profits....237
Time.... 238
Conclusion.... 239

Chapter VI.—Conservational Measures Requiring Application of Public Power

Outline.... 241
List of possible activities of government in conservation.... 242
Conservation measures possible to the government without acquiring ownership.... 243
(1) Compulsory application of certain good methods of mining and use of mineral resources, involving higher cost to the public.... 243
Uniform application of government power not feasible.... 244
Possibility of increasing price to allow conservation is limited.... 245
(2) Modification of laws allowing wider concentration of control of mineral industries.... 246
Possibilities of conservation through concentration of control.... 247
More government supervision needed where concentration of control approaches monopoly.... 247
(3) Permission to coöperate under government regulation.... 248
An immediate and practicable step in conservation.... 248
(4) Limitation on over-capitalization.... 250
"Blue sky" legislation.... 250
(5) Elimination of excess profits as measured by normal interest rates 250
Average mining profits not excessive.... 251
Uniform reduction of profits by governmental intervention works hardship on marginal enterprises.... 252
Introduction of gradational measures to avoid the elimination of marginal enterprises.... 252
(6) Avoidance of excessive taxation of mineral resources.... 253
Increased taxation may be partly met by lower cost of mining, by increasing price to the public, and by limitation of excessive profits... 253
Beyond a certain point taxation inimical to conservation.... 254
Reason for high taxes on mineral resources.... 254
Tax on certain Lake Superior ores already 25% of net earnings.... 255
Effect of taxation on exploration.... 255

PAGE
Tax on unexplored lands as a conservational measure 256
(7) Control of distributing agencies 256
Permission to coöperate would improve distribution 257
Conservation measures possible through acquirement of ownership by the government 257
Introductory 257
Government ownership may facilitate conservation measures 258
Conservational measures under government ownership may follow the same lines as under private ownership 258
Elimination of "resource cost" as a conservation measure possible by government acquirement of ownership 258
Better credit of government makes it possible to carry mineral resources at a lower rate of interest, and thereby lowers resource cost 259
Resource cost under private ownership not necessarily excessive 260
Possibility of lowering the rate of return through acquirement of privately owned mineral resources by the government 260
Government may carry mineral resources at a lower rate of interest than is possible by private ownership 261
Elimination of tax charges 261
Conservation of minerals already owned by the government 262
Opportunities for the government to introduce effective conservation measures for resources already under its control, thereby setting a standard for private ownership 262
Leasing of government coal lands with proper conservation safeguards 263
Extent of reserves as an argument for wider application of government power 264
Limitation of reserves not yet sufficiently clear as a basis for wider application of government power 264
Danger of monopoly as an argument for wider application of public power in conservation 265
Monopoly not yet apparent 265
Possibility of securing reserves for a new steel corporation 266
Military requirements in relation to conservation 267
Conclusion 268
Immediately practicable steps in conservation possible to government. 268
Essential to recognize existence of private and public spheres of endeavor in conservation 269

PART IV.—CONSERVATION OF HUMAN RESOURCES

By Thomas N. Carver, Ph.D., LL.D.

David A. Wells Professor of Political Economy in Harvard University

INTRODUCTION

PAGE

The human factor in national prosperity 275
Value of human energy 275

FACTORS IN THE ECONOMIZING AND THE WASTING OF HUMAN ENERGY

Chapter I.—Civilization as the Elimination of Waste

Economic values of moral qualities 277
Science, forethought and organization give civilized man dominion over the rest of creation 278

Chapter II.—Mechanical Appliances

Without an adaptable population mechanical inventions are useless ... 280

Chapter III.—Idleness as a Source of Waste

(a) The unemployed 282
The unemployed not the greatest source of waste 282
In a dynamic society, labor which is over supplied is of little value per unit 283
The kind of labor which is unemployed does not produce all wealth 284
It is a question of the advantage of more, and the disadvantage of less 284
The occupational distribution of the labor supply 286
Difficulty of utilizing the labor of the aged 287
(b) The leisure class 287
When talented men go to waste, the loss is great 287
(1) That Indiana farmer 288
Specialization even in growing corn and hogs is advantageous 288
Productiveness may be a genuine ideal 289
"A certain rich man" 290
Great geniuses have seldom stopped to enjoy consumers' satisfactions 291

PAGE
The uninspired plodder might well imitate the genius in this respect... 292
The most capable are they who can, if they will, retire from business earliest ... 293
But they, of all men, ought not retire ... 293
The peon desires leisure more than added income ... 294
He is very much like the rest of us ... 294
Productive ideals should be held up to the cultured classes ... 295
(2) Retiring from business ... 296
Society's greatest waste is the waste of rare talent ... 297
(3) Pensions ... 298
Pensions sometimes waste the best years of a man's life ... 298
(4) The distribution of talent ... 301
Society needs a balanced population ... 301
(5) Living on inherited wealth ... 303
They who live idly on inherited wealth are going to waste ... 303
(6) Lawlessness ... 304
Much enterprise is repressed by lawlessness ... 304
(7) Lawyers and priests ... 305
Litigation, like war, is waste ... 305

Chapter IV.—Ignorance as a Source of Waste

The ineffectively employed ... 308
All values based on the same fundamental principle ... 309
(a) The correct theory of education ... 310
The social needs should determine educational policy ... 310
Education should redistribute talent ... 311
The indispensable man is the great man. The superfluous man is weak 312
Exploitation and injustice account for much poverty, but not for all of it 313
(b) Social values ... 314
Property rights are human rights ... 314
(c) Conflict ... 315
Economic competition the highest and least wasteful form of conflict.. 315
Competitive production ... 315
Competitive bargaining ... 316
Many supposed economies of large scale production are mere advantages in bargaining ... 316

Chapter V.—Confidence and Economy

Dependability, in a society of interdependent parts, is of the highest utility ... 320

CHAPTER VI.—THE STANDARDIZATION OF GOODS AND OF CONDUCT

PAGE

Standardization and economy in marketing 324
Standards of quality as well as of quantity are needed 325
Standardization should take place early in the process of marketing... 327

CHAPTER VII.—VICE AS A SOURCE OF WASTE

Vice is the dissipation of human energy 329
In our interlocking civilization, drunkenness is probably the most destructive of all vices 329
The fool-killer is necessary, but he should work with accuracy and precision 330

CHAPTER VIII.—PRODUCTION VERSUS PREDATION

To protect the weak against the strong is a mistaken policy 332
The producer must be protected against the predator 332
How much would a man be missed is a rough test of his value 334

CHAPTER IX.—THE INVESTOR

The wise investor is an economizer at the source of all economy 336
Irrigation water may be used ineffectively unless it is conserved 337
Administrative distribution of water is cumbersome 330
Competitive purchasing has its drawbacks, but is economical 342
Productivity of water not likely to be questioned 343
Every investor is a purchaser of productive agents 343
Hiring labor and buying water are somewhat similar operations 344
Competitive hiring of labor likely to be economical from the social point of view 345
A bad investment almost the most wasteful thing short of absolute destruction 346
Investing is competitive purchasing of productive power 347
Some men have a genius for inventing, others for investing 348
Investing the most delicate of all economic functions 350
This is not an unqualified endorsement of big business 351
Monopolization not investment 352
Luxurious consumption does not add to the employment of labor 354
Blue sky laws safeguard investors 355

Chapter X.—Rational Consumption

PAGE
Spending money for "that which is not bread" 356
Any community can pretty nearly have whatever it really wants 357
It is as important that the community shall want the right things as that it shall be productive 358

Chapter XI.—Conclusion

Why it is better to tell the truth than to tell lies 360
Various types of nation builders 361

PART I

CONSERVATION AND ECONOMIC THEORY

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THE FOUNDATIONS OF NATIONAL PROSPERITY

CHAPTER I

CONSERVATION DEFINED AND DESCRIBED

Conservation, narrowly and strictly considered, means the preservation in unimpaired efficiency of the resources of the earth, or in a condition so nearly unimpaired as the nature of the case, or wise exhaustion, admits. And broadly considered, it means more than the word itself implies, for it naturally includes an examination of methods whereby the natural inheritance of the human race may be improved; and still more broadly considered,—and as used in popular discussion,—it includes a treatment of the effects of productive conservation measures upon distribution. We shall give our attention briefly to the main points in this informal definition before we pass on to the thesis that conservation is largely a matter of property-relations—that a wise conservation policy means wise property-relations.

Conservation is considered briefly to show that it is first of all a problem of property-relations. Conservation defined.

Conservation means three things: viz. (1) Maintenance as far as possible; (2) Improvement where possible; (3) Justice in distribution.

First, conservation suggests simply preservation, and, in the treatment of the subject which we have had in the United States, emphasis has been laid upon the past and present waste of natural resources and upon the means of putting a stop to this waste. The forests have been depleted; soil has been washed by rapidly flowing surface water from mountain sides. These rapidly flowing waters have pro-

The elements in the definition of conservation considered. It means preservation.

duced high streams and devastating inundations, followed by low streams and impeded navigation. The forests have, moreover, been so removed as to bring great danger of fire, and destructive conflagrations have resulted in large waste of resources, including often a destruction of the humus, supplying essential elements in the fertile soil. As a remedy we must have measures to reforest mountain sides, and this means large social control, very frequently taking the form of public ownership and management; but in addition we always find actual and proposed measures of coöperation with private owners. Illustrations are afforded by the services of publicly employed foresters in giving advice and in making plans. Here the main emphasis is on cessation of waste and restoration of natural advantages. This means a great deal and involves hard tasks. It is said that there are places in southern Europe where it will take three hundred years to restore the soil washed from the mountain sides, as it is necessary to begin at the bottom and by planting trees gradually to build up a fertile soil from falling leaves, decaying vegetation, etc., etc.

Public ownership of forests and also coöperation with private owners.

Another feature of the existing situation much discussed is the enormous waste of good soil by erosion, even in the more level portions of the earth's surface, as in the Mississippi Valley where millions upon millions of tons of precious elements of fertility are being annually washed into that turbulent stream and then wasted. It has been proposed to construct at public expense mighty reservoirs to check the rapidity of flow and to hold back the soil, which would also facilitate navigation. Here is one suggestion, and without entering into the extent of its possibilities, it is again apparent that emphasis is laid on preservation as nearly unimpaired as possible, or as care-

Waste of soil by erosion.

ful a using-up of supply as the nature of the case admits.

But in the second place we are concerned with measures to improve the natural inheritance of the race, and this is brought out more or less fully in discussions of conservation. Under a rational system of forestry it is claimed that an acre of ground will produce two or three times as much in a given period of time as the same acre in a wild state of nature, when the trees are allowed to grow up naturally without man's care. Conservation of water adds to the fertility of the soil or at any rate brings about a better utilization of the fertile elements when the water is applied to the land in irrigation. Modern agriculture, which is at least partially included in discussions of conservation, is not content with the maintenance of an existing status, but wants to improve what is. Nearly everything needed to accomplish this purpose may be found in the land itself, and if not available, may often be made so by cultivating green crops and plowing them under; and perhaps extracting from the air elements of fertility to be united with the soil. The phosphates and potassium seem to be the main, if not the only, elements which must be added from without and which are in no physical proximity to the land. It must be admitted that the supplies of these are far more limited than we could wish, although it is highly probable that new sources of supply will be discovered. And certainly there is no ground for present alarm: and for this assurance there are several reasons. With a general appreciation of the natural scarcity of these elements, economy in their use will be practiced to a greater extent and this economy will be further promoted by an increase in price, accompanying growing scarcity. The natural result will be to

Conservation means improvement.

Conservation in agriculture.

establish something approximating a cycle, whereby these elements can be returned to the land again and again. We see something of this sort in countries like China and Japan. We are, therefore, warranted in the belief that for an indefinite time to come, certainly for several centuries, the productivity of the land may be maintained and even increased.

The cycle of the elements.

In the third place, we observe that conservation, considered as a part of economics, has to do first of all with that division of economics which we call production; not with production in the technical sense, but in the social sense; in other words, with relationships arising out of the associated efforts of men to produce wealth. The question here has to be asked, what institutions or what shaping of institutions is most favorable to conservation? Here, as elsewhere in economics, we have to do with property and contract; and we find we cannot make much progress until we have adopted the social theory of property and the social theory of contract.[1]

Conservation concerned primarily with production.

And in the fourth place, conservation takes cognizance of distribution and aims to bring about justice. *In general, it may be said that the conservationists wish to cut off, or at least reduce, the private receipt of property and income beyond what is a fair return to capital and labor and enterprise, reserving the surplus for public use.*

Conservation takes cognizance of distribution and its aim in economic justice.

Notice, that we now get beyond the limits of conservation, strictly speaking, and are quite within the field of economics, but it would be arbitrary to stop the discussion at this point, where it yields fruitful results. This simply

[1] The limits of space prevent an elaboration of these theories; and this is the less necessary as the writer has discussed them elsewhere. See Ely's *Property and Contract*, Book I, Part I, Ch. VI and Part II, Ch. V.

shows that conservation is in large part economics; one of our fundamental theses.

Conservationists seek to control franchises for the use of water power with this end in view, reserving surplus value for the public treasury. They wish also a complete public control of mineral treasures, brought about by leases for the exploitation of these treasures when in public ownership, so that the lessees may receive no more than fair competitive gains; but some conservationists are inclined to look favorably upon at least a limited public operation of mines as well as ownership. The equitable distribution of wealth and income is then always included as an aim in thorough conservation discussions.[1]

Public control of water and of mineral treasures.

But when we reflect seriously on the subject of conservation, we see that we have to do here with two orders of inquiry; one of them falls within the broad field of the natural sciences; the other is economic in nature and is concerned with property-relations.[2] The geologist must instruct us about the formations of mineral treasures, about their amounts, about their exhaustibility, etc., etc. The scientific agriculturist deals with the cultivation of the soil and discusses methods for the maintenance and even increase of agricultural productivity.[3] Men who understand the natural laws governing the growth of trees are absolutely required if we

Conservation includes two orders of inquiry. The first belongs to the natural sciences.

[1] See Appendix, note 1.

[2] It is recognized that in certain of its features, conservation has to do with political science and sociology. Here and now we must confine ourselves to economics as that one of the social sciences with which we are chiefly concerned in conservation.

[3] The maintenance of productivity and conservation of elements are two different things, but it would take us too far into scientific agriculture to discuss this distinction here.

would frame a wise forest policy. It is a question of natural science to determine the relative amounts of forest products which can be expected under low and middle and high forest culture, all involving different periods of time.

Our second order of inquiry is economic and it is this order of inquiry which gives us our most difficult problems.

But chief emphasis must be laid on the much neglected question of property-relations. Is the system of leasing public land to private parties favorable in the case of mines? We have to do in this case with the relations of public property to private operation and to private property in the implements of operation. Shall the federal government, the states, cities and other local political units acquire private lands for forestry? Here we are concerned with the extension of public property in land and the corresponding contraction of private property in land. How shall we encourage oyster culture? Shall we make the beds of bays and rivers and bodies of water where oyster farming is feasible private property? If so, we extend private property and contract correspondingly public property. Shall we reserve public property in underwater-land and encourage oyster farming and similar production of other sea-food by a system of leases which will encourage private investments of capital? Again, we are concerned with property-relations. It is in the property-relations most suitable for conservation that the greatest difficulty arises; and it is on this account that the chief rôle in conservation belongs to the political economists, who must cultivate more diligently than heretofore that part of their field which we may designate as economic jurisprudence. When we decide upon what we want so far as property-relations are concerned, engineers and other technical men will be able to carry out the desired policy and political science, includ-

ing administration, must be called on for aid. Oyster-farming will flourish when we devise and put in force right property-relations, and furthermore it will flourish without the establishment of injurious private monopolies.

Irrigation affords illustration.

Irrigation furnishes also an excellent illustration. The government of the United States has encouraged technical investigation. Much effort, and very properly, has been put upon ascertaining the underground flow of water and what is called the duty of water, i. e., the work which a given quantity of water may accomplish; the aim being to avoid waste and accomplish the maximum of effect with the minimum of effort. The questions of when and how to apply the water are involved here; and many other technical questions, some of them purely engineering, some of them primarily agricultural, could be mentioned. These are technical and essential.

Litigation and other social costs are the result of a failure to establish satisfactory property-relations.

But litigation has been rife and in some parts of the country has ruined many a farmer, resulted in mutual hatred of neighbors, and occasionally even in bloodshed; while an appreciable proportion of the benefits of improved farming by means of irrigation has been swallowed up in the needless costs, direct and indirect. In the meantime the vital question of property-relations was neglected, one great department, the Department of Agriculture, at one time even taking a discouraging attitude towards economic study. However, this has all been changed under the efforts of the present Secretary of the Department of Agriculture. Now, when property-relations are settled, the rest becomes comparatively easy.

But heretofore there has been a general failure to appreciate the significance of property-relations as a necessary foundation of conservation.

The United States Government in the Reclamation

Service has not neglected property-relations so far as its projects are concerned: for they are based on a rearrangement of property-relations in the interest of the public and the parties immediately interested. The giving up of old "priorities" so as to promote a better distribution of water is here referred to.[1]

The Reclamation Service in its management of irrigation projects wisely took account of property-relations.

[1] See Appendix, note 2.

CHAPTER II

CONSERVATION AND POLITICAL ECONOMY

But a question of real significance must have already suggested itself: Why has the political economist played so small a rôle in conservation in the United States and in general in English-speaking lands? Why have men in other fields taken an almost exclusive leadership in this movement, many of them not even knowing that their discussions belong primarily to political economy?

Conservation long treated by economists especially in Germany, but under other names.

First of all, let us notice this fact, that it is the word conservation that is new as a term to describe the policies which are included within its scope.[1] Every policy that is recommended has somewhere been tried, and especially in Germany do we find already in practice—some of them indeed for a very long time—many of the measures that are urged in the United States. In 1893, long before we had heard about conservation as such in the United States, a German commissioner representing his government at the World's Fair in Chicago was asked what most impressed him in America. After some polite hesitation and after being repeatedly urged to state his opinion frankly, he said in effect: "What impresses me most is that you are a nation of butchers." And then he went on to explain that we were butchering or slaughtering the gifts of nature, wasting

[1] Dr. Gifford Pinchot writes, "The new thing is the conservation policy as a unit—an integral movement." This is also true. Dr. Pinchot also says "The name was devised in the United States in 1898."

our forest resources, our mineral treasures, our soil. Familiar with conservation in his own land, he was more impressed with its absence in the United States than with anything else. Those who attended German lectures on "Practical Political Economy" thirty years and more ago heard the topics discussed which are now placed under conservation and heard measures recommended closely resembling those now urged by the conservationists. Moreover, forty years earlier Friedrich List elaborated a theory of productive forces which contained some of the features of a theory of conservation.[1]

It is suggestive to reflect that while in English-speaking lands economists have not played the leading rôle in conservation, we hear of no distinctive conservation movement under that name in Germany. These two facts taken together throw a flood of light on our topic. In England, economics has been largely cultivated as an abstract, hypothetical and deductive branch of knowledge, and in this particular France has followed the lead of England. Jean Baptiste Say said: "Economics is not eager for facts." Now it is to be expected that conservation would receive slight attention under such circumstances; because conservation means keeping one's eyes open, following the maxim of Richard Jones, an English economist, who protested against the dominant tendency of the first half of the nineteenth century in England, and said if one would understand economic life one must "Look and see,"—a phrase which has become a rallying cry.

[1] The writer is indebted to Professor M. J. Bonn, of the University of Munich, for calling his attention to the work of List. He also mentioned the fact that J. Liebig and his school laid a natural science foundation for conservation both with respect to practical life and theory.

See also Appendix, note 3.

In Germany, the close connection between the State and the Universities made it necessary that men should "look and see," for there the Universities are largely institutions designed to train men for the civil service in its various branches, being to this service a good deal what West Point and Annapolis are to our army and navy. A certain realism was forced upon them. They had to give attention to facts of production, present and future, otherwise men trained by them, would not be fitted for their responsibilities, when they came to direct economic activities falling within their sphere. Moreover, Germany, being in large parts of its area not blessed with a particularly fertile soil and not especially rich in mineral deposits, was obliged to use with care the natural resources of the land, and to improve the natural heritage in order to provide for a rapidly growing population. Now to use with care means conservation, but conservation, as we have already seen, means also still more than the term strictly construed signifies, it means improvement. Then we must consider also the German idea of the State, as an institution representing all the people, past, present and future, coupled with the idea of devotion to it as a sacred duty of the citizen; and this necessarily produced an attitude of mind favorable to conservation. It is not implied that the tendencies in Germany were altogether good, nor that the tendencies in England were altogether bad. The English economists excelled in careful analysis and in deductive reasoning; and using familiar facts as premises, were able to build up a system of thought which has accomplished wonders, both good and bad, but with the good dominant. No German names stand out quite so conspicuously in the

The nature of the German Universities such as to force a realism on them, favorable to a study of conservation.

The German idea of the State favorable to conservation.

history of economic thought as do names like Adam Smith, Malthus and Ricardo. But German realism compelled a careful study of facts and the most of what is embraced in conservation is treated in Germany in political economy, and has so entered into their life that that country has already achieved a large part of the programme of American conservation. Forests have not there been slaughtered; on the contrary, they have been cultivated, so as to yield maximum returns, they have mostly been placed where they should be, they have been extended suitably in proportion to arable farm land; and all this means that instead of being scattered in small wood lots, they cover large compact areas. The preservation or conservation of game is connected with the forests, and wild game is far more abundant than in the United States, furnishing an appreciable element in the supply of meat, which is increased thereby in variety. Mineral resources are also exploited more nearly in accordance with economic principles than in other countries, and an earnest attempt is made to establish a proper proportion between public and private interests.

But while early American economics was abstract and deductive, such a change has taken place, in economic ideas and methods, that we cannot find in the scope of our science to-day an obstacle in the development of the economic side of conservation. This change after a period of incubation, assumed epoch-making importance when the American Economic Association was founded in 1885; and that was in the minds of many, if not all, of the founders, a protest against that excessive cultivation of deduction and that narrow view of the scope of economics, which shut men's eyes to the economic significance of conservation. Furthermore this association in it

American economists treated conservation in the eighties.

tatement of principles antagonized *laissez-faire*, which in ts very essence is fatal to conservation, and advocated a road view of the State (using state in its generic sense) which is a first condition of conservation.

But before the American Economic Association was stablished, two young Americans, recently returned from Germany, Professor, now President, E. J. James and Professor Simon N. Patten, proposed the rganization of another association to be called the Society or the Study of National Economy, and their programme r statement of aims make it clear that they had as one f their aims what would now be called conservation. Among the most obvious methods of serving the common nterests," the following is mentioned as number two: A careful investigation of our mineral and agricultural esources by means of accurate surveys of the geology, ora and fauna of our territory, so that we may best en- ourage our mineral wealth, discover injurious animals and lants, prevent their propagation, and develop and pre- erve those which are likely to prove useful." Very early n its history, viz. in 1891, the American Economic Associa- ion showed its appreciation of one of the more mportant aspects of conservation by publishing monograph on forestry consisting of three papers; one y Mr. Gifford Pinchot, on "Forestry Abroad"; one by Ir. Edward A. Bowers, on "The Present Conditions of orests in the Public Lands"; and the third by Mr. B. E. ernow on "The Practicability of an American Forest dministration".

Work of James and Patten.

Publications of the American Economic Association.

While the writer cannot speak positively about the lassroom work of his fellow economists in the ighties and nineties, he has no doubt many of hem were doing as he did in bringing forward and discus-

A new economic philosophy:

sing conservation topics and recommending conservatio measures. His own discussion took form in a dra of lectures made at Wisconsin in 1898, which gave th measures now very generally recommended in regard to mi ing. It was the work of economists in preparing the publ mind throughout the length and breadth of the land tha helped to make possible the later work of the conserva tionists. Through Chautauqua lectures and books ci culated in every part of the country, almost in every villag and hamlet, a new economic philosophy, a new way looking at things, a new attitude towards the State gra ually made its way and prepared men for the extension governmental functions called for by conservation mea ures. Also the writer's early treatises, beginning with t *Introduction to Political Economy*, published in 1889, di cussed some of the conservation measures, and they w written in that spirit. Forestry was discussed and for it

The State the guardian of the permanent interests of society.

conservation policy was then advocated, while emphasis was laid upon the State such as in t writer's opinion can be found in no earlier Am ican economic treatise, the State being presented as guardian of the permanent interests of society. Now t view of the State is the corner-stone of wise conservati policies; a very sine qua non.[1] Now this book was p

The work of Chautauqua for conservation.

pared for the Chautauqua reading course, el where. And Chautauqua was then able take the message to every part of our broad land; a in this respect and otherwise Chautauqua has done

[1] See Ely's *Introduction to Political Economy* in edition of 1889, page where it is stated among other functions of the State, it must "guard tain permanent interests of the nation, such as the maintenance of a su cient area of forests suitably selected." As stated above, the entire tr ment of the State is such as to favor conservation. Although the book brief one, two pages are devoted to forestry. See pp. 90–92.

foundation-laying work little understood for progressive economic policies. Do not think that the writer would speak boastfully about his services; he carried on and re-interpreted for America the message of conservation he received from his teacher, Karl Knies, of Heidelberg; and Chautauqua under the broad, liberal and fearless guidance of its founder, Bishop John H. Vincent, afforded the opportunity to do a nation-wide preparatory work.

In the year 1896 Dr. B. E. Fernow gave a course of lectures on the economic aspects of forestry under the auspices of the Department of Political Economy in the University of Wisconsin, said to have been the first course of forestry lectures in the United States given within a department of political economy. In these lectures he advocated conservation measures and these lectures were published in 1902 under the title, "Economics of Forestry".

Forestry lectures at the University of Wisconsin the first in the country.

In response to the writer's query, Dr. Fernow, now Dean of the Faculty of Forestry in the University of Toronto, wrote a letter, from which the following interesting extract is taken:—

"You are right in your assuming that my lectures on the Economics of Forestry were the first ones of the kind to be delivered, not only on this continent but in England, and I am agreed with you as to their historical rôle in the conservation movement. In this connection, I also call your attention to my vice-presidential address, 'The Providential Functions of Government with Special Reference to Natural Resources,' before the American Association for the Advancement of Science in 1895, which probably was the first time that this matter was discussed broadly in public."

Dr. Fernow does not at all overestimate the significanc of his address. He may at the time seemed to have been voice crying in the wilderness; but, if so, the note was clea and distinct, and who can tell what effect he may have ha upon subsequent developments?

CHAPTER III

CONSERVATION AND FORESTRY

It will be observed that in the discussion of economics and conservation, forestry has been repeatedly mentioned. This is no mere chance. Forestry was the main feature of conservation developed in the lectures of Professor Karl Knies on Practical National Economics and Economic Policy (Praktische National-Oekonomie, und Volkswirthschafts-politik); while underlying all was a view of the State, and in general an economic philosophy, altogether favorable to conservation. As this feature of conservation was so highly developed both theoretically and practically, it was very natural that the doctrines of conservation should be introduced into this country in connection with forestry.

Forestry especially emphasized in the lectures of Prof. Knies on Applied Economics in the last quarter of the nineteenth century.

And in the United States conservation was first strongly emphasized in connection with forestry.

There are two special reasons why this should be the case. The first one is mentioned by President Van Hise, in his book on the *Conservation of Natural Resources in the United States* (1910), namely, that the forests were the first of the great natural resources in the United States, which were destroyed so rapidly as to attract attention and awaken alarm; the second reason is that it was in considerable part due to the influence of men trained in Germany that the theories of conservation were developed. Eighteen hundred and seventy-three is the first date mentioned by President Van Hise, in his brief history of the Conservation Movement in the

Two reasons for this: first the rapid destruction of our forests; and the second that men trained in Germany were especially prominent among those who called attention to conservation in the United States.

Introduction to his book. To quote briefly from President Van Hise:—"As the result of a memorial presented by the American Association for the Advancement of Science in 1873, reënforced by another memorial of the Association in 1890, the movement was inaugurated which resulted in a forestry bureau in the department of agriculture, and in laws which led to the first national reserve in 1891. The national forest movement was further advanced later as the result of an elaborate consideration of the question by the National Academy of Sciences in 1897. The principle of the national forest once established, these forests were enlarged from time to time, but the great withdrawals of the forests from private entry have been during the past ten years."

The memorial of the Association for the Advancement of Science in 1873 started the movements which led to a National Forestry Bureau.

Perhaps quite as much importance is to be attached to the fact that Dr. Fernow in the seventies began advocating conservation theories and policies in the United States. He had studied and practiced forestry in Germany. Dr. Fernow reports that in the early seventies some attempts were made to call attention to forestry, but that the word was not to be found in Webster's, and that when he introduced himself as a forester, men seemed to wonder if he might not be another Robin Hood, Robin Hood being the only type of forester then generally known to the American public. Dr. Fernow mentions the work of Dr. Franklin B. Hough at this time, who was appointed as agent under the Commissioner of Agriculture and was in charge of such forestry activities as were then conducted by the department. In the same year a permanent State Forestry Association was formed in Minnesota and also a National Forestry Association. An Arbor Day had been established in 1872, but the effects while on the whole beneficial, were in some respects

Dr. Fernow's pioneer work.

Arbor Day.

detrimental as it conveyed the idea to many that miscellaneous tree planting was a real conservation measure. The Division of Forestry was created in 1882 and it was in 1886 that Dr. Fernow took charge of the work of Forestry in the United States Department of Agriculture, and in this year the Pennsylvania State Forestry Association was established. The Forest Service was created February 1, 1908. Nor should we neglect to mention the work of Dr. Gifford Pinchot which has been epoch-making in conservation. We cannot here consider the history of forestry in the United States and the names of the devoted men who, primarily foresters, have done a fine work for conservation. We now and here simply wish to acknowledge their priority and the leading rôle they have played in conservation policies in the United States.

Returning to Dr. Fernow's address of 1886, a quotation will show that no one since his time has had a greater appreciation than he of the importance of conservation. He uses these words in his address:—

"The study of the nature, relation to social life and development, and the economy of resources becomes a most important branch of social science, which will overshadow some of the other branches, now appearing all-important. When the questions of the extension of suffrage to women, of tariff, of taxation, of coinage and currency, which are all merely incidents, shall have sunk into the background, the question of the economy of the resources which constitute and sustain the political, commercial, and social power of the nation, long neglected, will still claim attention; for only those nations who develop their national resources economically, and avoid the waste of that which they produce, can maintain their power or even secure the

The life of the nation.

The destruction of natural resources is possible cause of the downfall of nations.

continuance of their separate existence. A nation may cease to exist as well by the decay of its resources as by the extinction of its patriotic spirit.

"Whether we have a high tariff or no tariff, an income tax or a head tax, direct or indirect taxation, bimetallism or a single standard, national banks or state banks, are matters which concern, to be sure, the temporary convenience of the members of society, but their prejudicial adjustment is easily remediable; when ill effects become apparent, the inconveniences may be removed with but little harm to the community and none to mankind at large, or to the future. But whether fertile lands are turned into deserts, forests into waste places, brooks into torrents, rivers changed from means of power and intercourse into means of destruction and desolation—these are questions which concern the material existence itself of society, and since such changes become often irreversible, the damage irremediable, and at the same time the extent of available resources becomes smaller in proportion to population, their consideration is finally much more important than those other questions of the day." [1]

Former economic philosophy of laissez-faire antagonistic to conservation.

In the next place observe that Dr. Fernow clearly sees that conservation is impossible so long as the American people hold to their old *laissez-faire* ideas. Individualism cannot in his opinion solve the problem. He also rejects socialism, but advocates a philosophy which is sometimes called the philosophy of social solidarity. The individual is limited in his vision, and is inextricably bound by his interests and in some cases by those of his family. He may look forward to the second generation, but even that is rare. Two quotations from Dr. Fernow illustrate this point:

[1] See Appendix, note 4.

"It is true that as individuals the knowledge of the near exhaustion of the anthracite coal fields does not induce any of us to deny ourselves a single scuttle of coal, so as to make the coal-field last for one more generation, unless this knowledge is reflected in increased price.

"Mark, we do not create this special providence for the individual, but for society; the individual will have to work out his own salvation to a large extent with the opportunities for advancement offered by society, but society itself can only act through the State or government, and as the representative of the future the State cannot, like the individual, 'let the future take care of itself.'"

The state alone can safeguard adequately the interests of the future.

Dr. Fernow shows that in some cases we already limit waste and practice conservation. He instances hunting and fishing where we have closed seasons, although he says here we have to do with something relatively unimportant.

In the third place Dr. Fernow classifies natural resources, and this is an indispensable condition of any satisfactory treatment of them. His classification is as follows:

Fernow's classification of natural resources.

1. Resources inexhaustible.
2. Resources exhaustible and non-restorable.
3. Resources restorable, but liable to deterioration under increased activity.
4. Resources restorable, and apt to yield increased returns to increased activity.

In the last place, Dr. Fernow says that we have to do in conservation very largely with political economy, and he closes his address with the hope that students of political economy "will see that this branch of their science, the economy of natural resources, so important and yet so

much neglected, requires on their part a fuller and more careful consideration." [1]

[1] From address, "The Providential Functions of Government with special reference to Natural Resources," American Association for Advancement of Science, Proceedings, 1895, vol. 44.

CHAPTER IV

THE SERVICES OF EX-PRESIDENT ROOSEVELT, DR. GIFFORD PINCHOT, PRESIDENT VAN HISE AND THEIR ASSOCIATES IN THE NEW CONSERVATION MOVEMENT

Foresters and economists prepared the way for the great Conservation Movement, led by President Roosevelt, Gifford Pinchot and President Van Hise.

We see then that first the foresters and then the economists, as well as many others and especially those silent influences proceeding from economic evolution, had been preparing the way for the Conservation Movement, so when President Roosevelt used this new term and with a marvelous skill all his own called attention to the reckless and prodigal waste of national resources, there was a prompt response. A campaign was started which has already brought and is still bringing large results and is destined to transform many features of our economic life. Did time permit the writer would gladly describe the results already achieved and what is still going on in spite of a temporary reaction, due on the one hand to selfishness and ignorance, on the other, to the indiscretions, exaggerations and other mistakes of certain conservationists whose wisdom was not equal to their zeal.[1] But if the economists helped prepare the way, we may say that under the leadership of President Roosevelt and such men as President Van

[1] Dr. Gifford Pinchot writes: "I question this. Not one policy proposed has had to be modified or recalled." This may be true so far as personal recommendations and what may be called official utterances of men like Dr. Pinchot are concerned; but what is said in the text holds so far as many popular writings are concerned; and even some of the utterances of able leaders were not so guarded as could have been wished. This is always true with a new movement.

Hise and Gifford Pinchot, the public first became conscious of the real import of conservation policies.

We yield then full credit to the scientists who have gained the leadership in the conservation movement and who have done so much to get us on the right track, their literary efforts culminating in President Van Hise's epoch-making book, *The Conservation of Natural Resources in the United States*, and their practical efforts reaching a high point in the Conference of Governors called by President Roosevelt, which met in 1908, and which so emphasized the series of vital measures for which it stood as to change perceptibly the movement of economic evolution on a great continent.[1]

It has not been attempted to present a complete history of conservation in the United States. Of necessity some important treatises have been omitted as well as names which occupy an honorable rôle, like that of the late Major J. W. Powell, so important in connection with irrigation, to which only allusion is made. Dr. W. J. McGee's [2] name is one which must not be entirely omitted. The purpose has been mainly to help give the economists their proper place in conservation. The technical men, the men of natural science, are indispensable in conservation, but the economists must contribute their part also to the movement, to make it all that it should be, and not simply let men of other fields gradually become economists and usurp their territory.

But the economists should be among the leaders in this movement.

[1] Proceedings of a Conference of Governors in the White House, Washington, D. C., May 13–15, 1908. Washington Government Printing Office, 1909.

[2] W. J. McGee—anthropologist, geologist and hydrologist (1853–1912), was the author of *The Agricultural Duty of Water*, 1911, but probably is chiefly to be remembered with conservation as the Recording Secretary of the Conference of Governors referred to above.

CHAPTER V

SOME ECONOMIC PRINCIPLES OF CONSERVATION

Conservation in its economic aspects has such a wide sweep that it is difficult to lay down many principles of universal application, but several can be elaborated which have very far-reaching application.

Economic principles of conservation.

"What is waste?" The question is simple; the answer is in many cases extremely difficult. The Century Dictionary has over two columns devoted to the word waste as noun, adjective and verb, but does not satisfactorily answer our question. Under the verb, one definition is—"to expend without adequate return." That is, at any rate, helpful. You see apples decaying on the ground in my orchard. You ask, "why this waste?" If the reply is, "It will take two dollars' worth of time to gather one dollar's worth of applies," are you satisfied, that there is no economic waste? But this is precisely the case with a great deal of what the conservationist frequently calls waste.

What is waste?

As the idea waste lies so near the very heart of conservation theory, we must pause long enough for a brief examination of the concept, first of all considering it with respect to production. *By wasteful production we mean production which yields a total return to all the factors of production less than that which some other available employment of the same factors would yield at a particular time and place.* Let us take the case of the man gathering apples which are going to decay at a time when

Wasteful production.

there is a poor market for apples, apples when gathered being worth twenty cents a bushel at a market four miles away from his orchard. We assume that the time of the man is worth $3.00 a day, that the total cost of getting them to the market and selling them there is ten cents a bushel, and that the apples lying on the ground are worth for feed for hogs and for fertilizer three cents a bushel; furthermore, that the man can gather twenty bushels a day of marketable apples. He gathers then apples which will yield $4 as a result of the day's work; offsetting that we have for his time $3 plus $2 marketing costs, plus sixty cents that the apples were worth lying on the ground, a total of $5.60; in other words, his apparent thrift really means a waste of $1.60. This is a crude illustration of a general principle, and shows that often without accounting we cannot tell what is wasteful and what is fruitful economic effort. Farmers and all other classes of producers are often wasteful in their productive efforts because they fail to keep account of costs.

Let us consider further our illustration: Suppose the man's time worth only $1.00 a day. He could then afford to gather the apples and to fail to do so would have been wasteful. Let us suppose the price of the apples higher or marketing costs reduced, again the results would have been different—scarcity and high prices or low wages result in a saving of material products and make that economic action which would otherwise be wasteful action. What appears wasteful prodigality in a new country may be thrift; but often it is not. One can know only when the various elements in the operation are analyzed and critically examined.

Let us take the case of a large peasant family in France or Germany. The family is hard working and thrifty.

They do some work which yields perhaps only a cent an hour. This may be work at times about the house or in the garden. Is any other employment of the time better? If we are concerned with the work of the children, they may be learning habits of regular and continuous industry which have a high value for the future and which will be worth far more than the immediate economic return; and if we are concerned with the women of the household, again we have to ask, what alternative is open? If the alternative is gadding or gossip, we have a clear gain. If, however, children and women are overworked and deprived of wholesome recreation and the cultivation of pleasant social relations, we have to that extent a misapplication of effort.

In production we have enormous waste of human and natural resources because production is badly organized and poorly directed. The same effort and the same expenditure of resources plus better direction frequently would yield far larger results. The amount of waste involved on account of inadequate land policies is almost beyond calculation. It is especially revealed in the poor choices men make of land. The history of the settlement of land in this country reveals at every step wasted fortunes and blighted lives. It has been conclusively proved by Professor Mead and his associates in their Report of the Commission on Land Colonization and Rural Credits of the State of California, Nov. 29, 1916, that in colonization schemes it is the exceptional man who has made a right choice. Nowhere else does the man who desires to become an independent farmer need aid more than in the choice of land, in order to avoid needless mistakes. Probably the chief work must be done by State Boards and Commissions, but these should be aided by very thoroughgoing economic surveys in order to give us quality classi-

Inadequate land policies.

fication of land with certification. Apart from State Boards and Commissions a great work can be done by private agencies, like the City and Suburban Homes Company of New York City. This Company has done a great deal to improve tenements in New York. A company organized along somewhat similar lines, which might be called the Suburban and Country Homes Company, limiting as does the city and suburban homes company its profits, might do a great work in placing people on the land.

The remainder of this book will throw more light on the question; and will show that often we must choose between destruction of a proportion, larger or smaller, of natural resources and a loss of human well-being; and as the natural world exists for the human world, we know how we must decide when the issue is clear-cut between the two.

Conservation often means intensive use.

Conservation means in a large number of cases what economists usually designate as intensive as opposed to extensive use. Now intensive use means in general high price of land. This is true in agriculture—excellent fences, careful cultivation of the corners of field and the edges near the fences, if there are fences; also fields entirely free from weeds, which means the hoe as well as the horse cultivator. It means going beyond the point of increasing returns to decreasing average returns in most cases. Nearly if not quite everywhere in the United States the intelligent farmer stops when to go further decreases his net money income; this means in a new country very often that the hoe is never used—that the edges of fields are ragged—that fences are not so neat in appearance as æsthetic interest would demand.

High price of land promotes good farming.

The higher the price of land, the better the farming in the sense of product.[1]

[1] See Appendix, note 5.

Warren in his *Farm Management* comes back again and again to high price as a cause of good farming—good in the sense of large production per acre, for example, gathering the apples in our illustration. A soiling system, i. e., bringing the feed to cows, is conservation in the sense that it means more return per acre, but Warren says truly, "The labor of hauling the feed and manure, to say nothing of the cost of growing the crops, would more than pay the pasture bill on most dairy farms. It is evident that land and milk must be very high in price, before a soiling system will pay" (p. 179). And we find the following observation in the chapter on "Maintaining the Fertility of the Land".

"We have good years and poor years, but crop yields are increasing very rapidly. All that is necessary to have them go up still farther is to pay the farmer more for his produce. By bringing in land that is now little used, and by better methods of farming, that are already known to farmers, it would probably be possible to increase our total production of crops fifty per cent in three years, if the farmer could be assured of prices high enough to warrant the expense involved."[1]

Undoubtedly it is true that without an increase in price, something may be done to increase yield. Sometimes farmers are more intensive than they can afford to be, but generally less so. The following from Warren is a correct generalization: "The farmer's problem is to intensify his business up to the point of greatest profit for his conditions. Since conditions are gradually changing in favor of more intensive methods; and since there is a tendency for the average person [2] to lag behind, it follows that a little more intensive

In general somewhat more intensive farming would be profitable in the United States at present prices.

[1] Warren, *Farm Management*, pp. 183–184.

[2] It is not a question of average. Many lag behind and for all these better farming would be profitable.

methods than the average of the community will usually be best" (pp. 179–180). But observe methods are changing to favor intensive farming because land prices are higher.

Progress in the art of agriculture encourages better farming.

Another thing to be noticed is that improvement in knowledge and art increases the profitable intensivity of farming. We learn how to increase yields at a given price.

In what has been said we have a partial explanation of the intensive dairy farming which may be seen in parts of Europe, e. g., near Frankfort on the Main. But we have only a part of the explanation. Low wages are another part of the explanation; for, other things being equal, *the higher wages are, the less intensive is that farming which is profitable; the lower wages are in a given state of the arts, the better the farming which is profitable.*[1] High wages encourage the use of machinery, and this is a partial offset, but only a partial offset to high wages. *If wages could be cut one-third and the labor supply increased correspondingly, we should witness an improvement in farming which would be in the direction of conservation of natural resources and would please the æsthetic eye; but observe it is a conservation of natural resources which is at the expense of human resources.*[2]

High wages in general antagonistic to conservation.

[1] High prices and low wages result in increased intensivity by drawing rent up. It is high rent with high land values that makes intensive farming profitable.

[2] Economic theorists will want to elaborate further and qualify the statement. High prices and low wages would in some cases result in larger scale and less intensive culture; but what is said here holds as a general statement. Rents would usually increase. Movements of population must be considered if we are to make our theory complete: but to do this would mean an immense enlargement of the present treatise.

Now this can be illustrated endlessly, in mining, as well as in agriculture. If we save all the ore taken from the mines in the Mesaba region in Minnesota, the price of iron ore must increase very materially or wages must fall, or both effects must be produced and either one means lessening real incomes of the community at large. As in farming, somewhat more economical methods could doubtless be employed at present prices for ore and present wages; but at best large waste of natural resources must continue, i. e., a great deal of the ore must remain unutilized.[1]

The conservation of human resources limits the conservation of natural resources.

Conservation of natural resources everywhere finds its sharp limitations in human resources, i. e., in human well-being.

Once again, conservation means a sacrifice of the present generation to future generations, whenever it is carried far; this conflict beginning far before the ideal is reached which conservationists are inclined to advocate.[2]

Conservation in general means a sacrifice of the present interests to future interests.

This is implied in what we have already said. High prices and low wages or even high prices with present or higher wages mean a sacrifice of the interests of the present consumer. How shall we balance the interests of the present and the future? If we put them on absolutely the same plane, we could with propriety forego all use of the exhaustible natural resources like petroleum and natural gas—it would be at any given moment of time indifferent whether or not we used them; and they might remain forever unused—a *reductio ad absurdum*.

[1] See Appendix, note 6.

[2] This may not hold with respect to all the leaders in the conservation movement. Dr. Pinchot writes of this statement, "I have always held that people now alive have the first rights."

One of the best articles on the economic theories involved in conservation is that written by Professor L. C. Gray, which appeared in the *Quarterly Journal of Economics* for May, 1913, under the title, "Economic Possibilities of Conservation". Professor Gray finds "the real heart of the conservation problem" in "the conflict between the present and future" (p. 499). He says that "the primary problem of conservation expressed in economic language, is the determination of the proper rate of discount on the future with respect to the utilization of our natural resources." He then continues as follows: "Some discount of the future, there must be. If society reduced the discount on the future to zero, the period of utilization would be increased to infinity; and therefore, the amount of present use would become infinitesimal. Conservation as a single principle of action involves the equal importance of future wants and present wants. It requires that the want of the infinitely distant future shall be as important as the want of the immediate present. Conservation as a single principle of action is reduced to an absurdity" (p. 515).

Professor L. C. Gray's discussion of the relations of present and future as fundamental in conservation.

This is precisely the conclusion we have reached. Any positive, statistical and mathematical solution is an impossibility, because the solution, as Professor Gray also points out, depends in the final analysis upon questions of individual and social philosophy. What is the purpose of existence? The source and nature of ethical obligation? our duties to posterity? all questions of the gravest import and beyond the range of economic science. But taking as a basis the ethical notions and sentiments of normal men, or perhaps those somewhat above the average man, we can find guiding principles and helpful suggestions in economic theory

Final analysis rests upon individual and social philosophy.

which we must apply as best we can in concrete cases in their infinite complexity.

Now as one of the first steps in conservation policies we must classify natural resources, because they differ markedly with respect to the intensity of the conflict between present and future interests. Some natural resources may be maintained forever or at least indefinitely with use—others may possibly be increased indefinitely while being used; others show increasing scarcity and exhaustibility; and where supply is so sharply limited in proportion to demand that we begin to feel the effects of coming exhaustion and where no renewal is possible, we have the sharpest conflict between present and future. Let us for our present purposes adopt the classification given by Professor Hess in Part II of the present work.

The classification of natural resources.

I. Resources which are so abundant as to have negligible present values, but bear promise of future scarcity and value.[1]

II. Resources which have present value and are subject to increasing scarcity or demand:—

a. Not exhaustible by use.

b. Exhaustible in use but subject to maintenance and restoration.

c. Exhaustible in use and not restorable.

III. Resources which have present value, but are subject to deterioration or loss of value through non-use.

IV. Resources which have no present value, but which are subject to "reclamation" and development to a condition of usefulness and value.[2]

[1] *Value* is here used in a commercial sense and should be distinguished from *social value*. Social value would include both present and future usefulness.

[2] For another classification v. Note 7 in Appendix.

Interest represents the difference between present and future to the individual. It has been said in the economies of the State, as in publicly owned forests, interest does not enter, that it is a concept in distribution of income among private persons; but, however that may be, we cannot avoid the recognition of differences between present and future. Can it be asked that we do more than discount the future at the lowest possible rate of interest paid by a prosperous state with well-managed finances, say two per cent? This is thrown out as a suggestion. It is only a little bit of a sidelight on the complicated problem.

Conservation and the interest rate.

It is essential at this point that we consider the case of copper and other natural resources which are probably fundamental conditions of permanent national existence. Even if there is some doubt about this, so long as it is at all probable that any national resource is essential to the continued and permanent existence of the nation, this resource occupies a peculiar condition. It is a first principle of political science that the State has immortal life. States have perished in the past, but political and economic science cannot take into account the possibility that our own national life will ever cease to exist. All wise plans must be based upon the hypothesis of continued national existence. Now in a case of this kind the future value of the natural resources rises to infinity, and however much we discount the future, we must still practice conservation. We must attempt so to utilize every natural resource of this kind that it may last as long as possible, using it now and using it hereafter for as long a time as possible. Here in reality the interest rate cuts no figure. When we consider resources of this sort, we find that in their case the def-

Indispensable natural resources very limited in quantity, a class by themselves, where the interest rate has no influence.

Van Hise's definition of conservation.

inition given by President Van Hise at the close of his book is applicable—"Conservation means 'the greatest good to the greatest number—and that for the longest time.'" [1]

There has been some discussion as to whether in agriculture we want the largest product per man or per acre. In general, it is doubtless true that the chief determinant should be the quantity produced per man. But the principle just laid down leads to certain qualifications. We have to consider not only the quantity produced per man now, but the welfare of future generations, and especially must we consider the condition of the country at war. The conservation of natural resources has to be regarded from a national point of view. No nation can consider it otherwise at the present time. From the German point of view we can see that it was important that Germany should sacrifice, as she did, something from the largest possible production per man to increase the production per acre. Conditions in Ireland also show that in the interest of present and future generations we cannot decide solely with reference to the largest production per man.

Product per man vs. Product per acre.

Adequate conservation in general means a course of conduct in economic affairs which is dictated by the common interest, but which will not be followed sufficiently by the private person under a system of laissez-faire, or non-intervention.

Conservation reveals an antagonism between private and public interests.

The complaint of the conservationists is precisely this: that the individual does not, as a matter of fact, conserve natural resources. What is going to induce the private person to follow the desired course of economic conduct?

[1] Van Hise, *The Conservation of Natural Resources in the United States*, p. 379.

The disharmony between economic environment and the demands of conservation.

We consider among various possibilities this: the individual through ignorance fails to follow a socially desirable course of economic conduct, when it would be in his own interest. We have already seen that often, perhaps in most cases, the individual could be more careful, more painstaking, more intensive in the sense of conservation—for not all intensive uses mean conservation. We have as a remedy against ignorance, education, and education can discover many new ways of conserving to a greater degree than at present all natural resources.

Even with respect to the present, education, if properly directed, will result in a diminished waste of economic goods. The development of ideas fails to keep pace with economic changes. A highly educated woman, a missionary, who had long worked in Turkey-in-Asia, was asked by a ladies' society in Buffalo what impressed her most on her return to her native land, and she replied, "Your garbage pails." She saw in them sinful waste—good food thrown away in a single city, which would nourish multitudes of half-famished people in Armenia. Several causes of American waste in this particular can be mentioned. One is that when food was superabundant, that was not waste, which is now wicked waste. It is not wasteful to feed potatoes to pigs when the supply is greater than the needs of all human beings who can be reached. We have in general left behind us the days of crude plenty, but have not adjusted our ideas nor our habits to correspond with new economic conditions. Here the need is intellectual and moral education,—a better vision and more altruism. We need a keener social consciousness and a new state-sense, if we are ever to solve the problems of conservation.

Moral and intellectual education must furnish remedies.

The individual is too frequently thoughtless and in-

different with respect to the future. Education of the intellect helps to a slight extent, because as men become more intellectual, the future means more to them. Moral education helps still more, as it means precisely a strengthening of the other-regarding feelings as opposing to self-regarding impulses. It means more self-control and ability to sacrifice within rational limits the present for the future. Better government means that the future counts for more, as it is more certain. Better health and long life further decrease the premium which the future must pay for present sacrifices. Without adding further considerations we may generalize as follows: *Every step forward in civilization means increased regard for the interests of the future.*

Civilization means regard for the future.

We have already attempted to formulate roughly the concept, waste in production. It is now worth while to attempt to formulate at least an approximate idea of *waste in consumption.* We may divide waste in consumption into several categories, e. g., *absolute waste*, *waste plus* and *relative waste*. *Absolute waste* means simply destruction of economic goods without any appreciable return, as when good food is thrown into the garbage pail or when serviceable clothing is destroyed. The amount of this waste is enormous and constitutes a large percentage of all wealth produced. When consumption produces positive harm we have *waste plus* and this happens when an excessive amount of food is consumed, impairing intellectual activity and producing diseased conditions of the body. Here again the waste is enormous and in many cases the plus effects are far greater than the direct effects. Even the most moderate users of alcoholic beverages must admit that a very large proportion of whiskey consumed is waste plus.

Waste in consumption.

Relative waste in consumption is disproportionate consumption. *That may be regarded as wasteful consumption which is disproportionate consumption with respect to the needs of the consumer and with respect to the needs of others.* Disproportionate consumption must have reference to one's life as a whole, past, present and future; and similarly it must have reference to these same periods in the life of others.

Disproportionate consumption.

Illustrations will throw light on this difficult concept. If it requires a mental effort to save one dollar's worth of food which if expended in direct productive efforts would yield two dollars, it is obvious there has been a total loss equal to one dollar. Here we have ground for discrimination among various economic classes. A great industrial leader upon whose strength and vigor the welfare of thousands depends and whose time has a very high economic value, is economical in his expenditures when the same expenditures for the ordinary mechanic or teacher would be extremely wasteful. This is a fortunate condition of affairs for the poorer members of the community, generally speaking, because they are able to practice the so-called small economies with advantage to themselves and others, the result being a total net gain. We have here an immense field for educational work which should result in better utilization of time, strength and material products.[1]

But, on the other hand, we must acknowledge that enlightened self-interest has a greater rôle to play in conservation than is generally understood. When attention fifteen years ago was called to the enormous waste of natural resources, the private owners began to think about the possibilities of profitable conservation; and they are still mak-

Enlightened self-interest has a greater scope than was appreciated in the early days of the conservation movement.

[1] See Appendix, note 8.

ing investigations and improving methods. Great mining companies particularly may be mentioned as illustration and naturally the owners of the fee in mining properties have shown a special concern. Real progress has thus been made; but the rate of interest sets a limit, as the writer's colleague Professor Leith has shown. Some ore companies have been obliged to recede in part (in part only, observe) from earlier conservation practices, because they found no prospect of getting interest on the investment involved in carrying saving so far as they were doing.

Large concerns are apt to be operated by far-seeing men, who acquire at times an interest of affection, so to speak, in these concerns, and they will be inclined to go as far as is practicable in conservation; as the country grows older, the interest rate is likely to fall and other causes will favor an increasing degree of conservation, due to private initiative.

But there is a sharp limit to the economic sacrifice that we may reasonably and ethically ask the private person to make for even the present welfare and the limit is still sharper when we come to consider the interests of future generations. When it is possible and as a general principle, social burdens should be socially diffused and socially borne.

The social burdens of conservation should be socially borne.

Let us consider some application of the principle we have just formulated. We know that it is one of the prime functions of the State (State used in the generic sense and including federal government as well as the separate commonwealth) to raise the ethical level of competition by legislation and administration. Men may work twelve hours a day under the system of *laissez-faire* and their employers may compete with one another. If by the State the number of hours is reduced to eight, the competition of employers may continue unchanged, save that it takes

place on a higher ethical plane. Endless illustrations could be given, taken from Sunday work, child labor, sanitary conditions, etc. Similarly we may establish a level of competition based on the principles of conservation. Practices not in accord with that level of conservation which we wish to establish, may be prohibited. When we decide how carefully the coal should be mined, and how much waste of natural resources in the exploitation of iron ore we are willing to tolerate as a maximum, we may prescribe methods giving the desired results; and we must bear the pain or burden in higher prices. Competition would not allow one individual to increase his costs greatly above those of his fellows; and so common action is a necessity.

An ethical level of conservation may be established.

The mention of competition suggests that unregulated and uncontrolled it is very generally speaking destructive alike of human and natural resources and that it is a force which like the flow of rivers needs to be bridled and guided to produce socially beneficent results. Destructive competition can only be prevented by social efforts. Again, the work of President Van Hise must be mentioned in pointing out in his book *Concentration and Control, a Solution of Trust Problems in the United States* (1912, revised edition 1914) the evils resulting from those "trust-busting" compaigns of politicians who advocate competition at all times and places and let loose upon us forces of destruction.

Unregulated competition is destructive; "trust-busting" campaigns proceed from prejudice and ignorance.

But as the principle of regularities in large numbers forms the basis of the vast business of insurance, it also furnishes a considerable scope for the activity of the State in the conservation of human natural resources. It is well known that individuals, especially among the wage-earners, are too

The principle of regularities in large numbers affords scope for social activity to promote conservation.

willing to take risks to life and limb. Let us suppose the chance of becoming a helpless cripple in the course of a year is as one to 10,000; this seems so small that the individual is generally ready to overlook it, and neglects measures to remove the danger. But to society there is no chance; only certainty of this human loss, which in its ramifications is far greater than is at first apparent. It means 100 wrecked existences per million and 10,000 per annum in a population of one hundred millions. We have in this principle of regularities in large numbers a wide scope for society to promote conservation alike in its own interest and in the interest of the individual. "The Safety First" movement is one of many evidences of an awakening realization of possibilities in this direction.

As another illustration of the possibilities of altogether wholesome conservation which comes under this general head, mention is made of the enormous destruction caused by fires in the United States. Public authority must compel those precautions which are alike in the interest of the individual and of society.[1]

But we may look at this question from still another angle. *Protectionism has often an educational value.* When we prohibit certain practices which exhaust natural resources rapidly, it will often be found that through the pressure of legal force, we shall be stirred out of a certain inertia of lethargy, and discover better methods which involve little or no increase in expense.

Prohibition of waste sometimes leads to improved but not more expensive processes.

But we find ourselves in a position where we shall frequently have to decide between private property and public property. The benefits of private property came in large part from the free initiative it

Private and public property.

[1] See Appendix, note 9.

allows the private property owner; and this is based on the hypothesis that in following his own initiative and knowing his own interest he is following a line of conduct which is in the interest of society. This is illustrated by the condition of the farmer, where we have a fairly satisfactory system of land tenure. The intelligent farmer in pursuing his own interest, in raising the best crops and animals at a minimum cost is doing exactly what it is in the interest of society he should do. The case of our railways is the opposite, for we regulate these to such an extent as to remove from private property a large part of its satisfaction and its benefits. So if we are obliged to regulate very far private property in the interest of conservation, we have a strong ground for public property; as illustrated in the case of forests, and in this case, public ownership is the world over gradually gaining on private ownership. Consideration of conservation then leads us to the following:

THE PRINCIPLE OF GUIDANCE IN CHANGES FROM PRIVATE TO PUBLIC PROPERTY AND FROM PUBLIC TO PRIVATE PROPERTY.

"Private property yields the best results when the social benefits of private property accrue:

Grounds for passing from private to public property.

"a. Largely spontaneously;

"b. When occasionally they are easily secured by slight applications of force;

"c. When the social benefits of private property are secured as the result of single public acts occurring at considerable intervals.

"d. Private property may yield excellent results, when in more or less frequent cases a continuous and considerable application of force may be needed to bring its management up to a socially established ethical level.

"But in proportion as the social benefits desired are secured by increasingly intensive and increasingly frequent applications of public power, the advantages of private property become smaller as contrasted with the advantages of public property." [1]

We have furthermore a ground for passing over to public property when for the sake of the public welfare now or in the future a kind of use is exacted, involving a greater sacrifice of individual and corporate private interests than is warranted by the doctrine of the police power, as accepted at a particular place and time.

We cannot discuss all these points, but the more one ponders this statement of the general principle, the more far-reaching it will appear in its application to conservation. However, just a word must be said about the last clause, which relates to the police power. We hold all our private property subject to that; in other words, certain general sacrifices may be exacted of all in the general interest, relating to health, decency, etc., and this burden increases as time goes on; but when we must exact more than is in harmony with this limitation, known as the police power, we have a ground for public ownership.

The doctrine of the police power.

No one is warranted in jumping to the conclusion that this principle means a suppression of private ownership of land and capital and of private initiative. On the one hand, our classification of natural resources shows that, so far as we can now see, they are mostly adapted to private ownership; we have also observed improved practices of private owners, rendering less urgent and less far-reaching the demands of public ownership; on the other hand, the growth

[1] See Ely's *Property and Contract*, p. 352, vol. I, for an elucidation of this principle.

of the police power in itself makes the field of public ownership narrower than it would be otherwise. Yet the general principle holds and no one can now foresee where the line will be drawn in the future. In the case of forests, the civilized world now recognizes a large amount of public ownership as necessary; so also with regard to the shores of harbors; so also with regard to mineral treasures, where there is general opposition to further alienation of the fee where it is now in public ownership.

The growth of the police power strengthens private property.

Conservation then necessarily means more public ownership, more public business; this means a demand for better government; and this means giving men a real career in the public service.

Conservation means better government.

CHAPTER VI

CONSERVATION POLICIES

Conservation policies must have as their aim the accomplishment of the three main purposes which have been described in Chapter I as constituting the conservation movement. They should aim to maintain our resources so far as possible, to improve them whenever and wherever possible, and, finally, they must be so framed as to secure as high a degree of justice in distribution as may be attained. The resources with which we have to do are divided into the two great main classes: **HUMAN** and **NATURAL.** This does not mean that the human resources are outside the realm of nature. It means, however, that they are so markedly different from the other resources we have that they can best be treated as a great class by themselves. We use natural resources, then, in the common and convenient sense of resources external to human beings.

Conservation deals with A. human and B. natural resources.

Human and natural resources are both as indispensable as are the two blades of a pair of shears and it may not be logical therefore to say that one kind of resources plays a larger rôle than the other kind. Nevertheless, as Professor Carver points out in this present work, when man is once provided with natural resources fairly generous in quantity and quality, the human resources determine what we are to have in the way of production, distribution and consumption of wealth. Better very moderate natural gifts with high intelligence and high intellectual and moral human qualities than the richest natural gifts with poor

human material. New England, on the one hand, and Turkey on the other, afford illuminating contrasts. Now it may be objected that the Turk has strength, courage and endurance and would be good human material if only he had good government, good education and a good religion; but when we consider the people of a country, we have to take them in their surroundings, with the government they have given themselves, the education they have achieved and the religion they have adopted. We may hope the Turks will in future ages become good human material—we cannot know.

In the United States and other highly civilized countries, we find the will to produce the needed amount of material resources and to distribute them justly according to the lights we have at a particular time and place. This is the ground, then, for the attempt to frame conservation policies.

HUMAN RESOURCES

Professor Carver discusses the conservation of human resources and therefore only a few words will be devoted in this place to this subject. Human qualities to be conserved, developed and wisely used may be, broadly speaking, divided into two main classes, namely, (I) those of the spirit and (II) those of the body. The spiritual qualities may be subdivided again into (1) intellectual qualities and (2) moral qualities.

The conservation policies needed for men may very largely be placed under the head of education, if we conceive education in its broadest sense. The question to be asked and answered is this: What kind of an education will do most to develop to the fullest extent all human faculties, intellectual, moral and physical?

Education.

It is often said that man must first of all be a good animal; and while acknowledging the prodigious feats and social services of men who have been very indifferent or even poor physical animals, no one will want to question the importance of all measures which tend to make men good animals. The handicaps suffered by those who are markedly deficient in bodily health either permanently or temporarily are obvious to all keen observers and especially to all those who have professionally to do with problems of health. Individuals go to ruin because of poor health and whole families are weighed down and often are crushed under the burdens of poor health and disease, too heavy for the shoulders upon which they are placed. Hospital expenses and physicians' bills are high and regularly come at a time of sadly diminished incomes. We have to do here with individual burdens which too often become social burdens.

Health.

Three reasons may be adduced for the encouragement of the already strong movement which makes the care for health in all its branches increasingly a public concern, a service like education. First, ailing people are able to contribute little or nothing to community burdens and responsibilities; second, as already mentioned, it is to be emphasized that the burden of weakness and illness frequently falls on society in the end. The direct and indirect expenses of crime and poverty are grievous social burdens and their connection with disease and poor health is a familiar fact. Very generally, inmates of prisons and almshouses are physically deficient in marked degree.

Care for health a public concern.

When the writer was a student in the seminary of Dr. Ernst Engel of the Royal Statistical Bureau of Berlin, he heard him make the remark: "Disease is a social phe-

nomenon." In the years that have intervened since Dr. Engel uttered this pregnant sentence it has come to have an ever increasing meaning. On the other hand, of course, we must not go to the extreme of overlooking individual causation and individual responsibility.

Engel's opinion.

The third reason why this movement for public medicine should be encouraged is closely connected with the foregoing. It is found in the fact that our health is increasingly beyond private control. Contagious diseases must largely be controlled by public authority and public authority alone is equal to the task of sanitation. In the very nature of the case, medicine must become more and more a public concern whether we will it or not. The movement is going forward until as already indicated, medicine becomes as large a public concern as education. The movement is world-wide, and irresistible. Doubtless we shall always have the private physician as we have the private teacher, but at the same time there will be provided public medicine for all, including hospital facilities.[1]

Contagious diseases controlled by public authority.

The experience of the University of Wisconsin in its Clinic is very instructive. Free to all students, it has improved in very marked degree the health of the student body. Students come as soon as they feel the need of attention and many escape a long illness which they would have suffered had they been by expense deterred from going early to seek relief. It has been definitely shown in the work of the Clinic that it is impossible to divorce *true* preventive medicine from the treatment of disease. It is the *early seeking of relief from suffering* that makes possible the prevention of

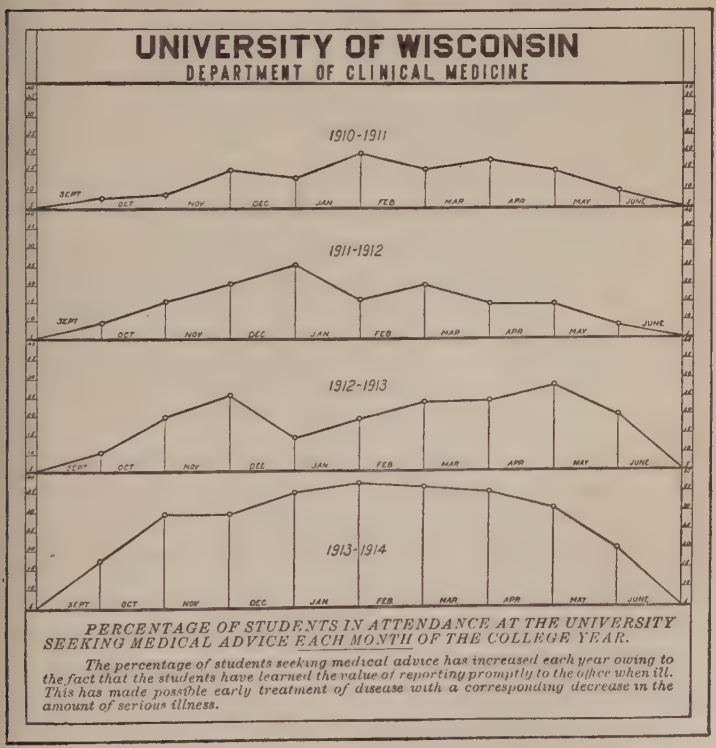
The University clinic at Wisconsin.

Preventive medicine.

[1] See Appendix, note 10.

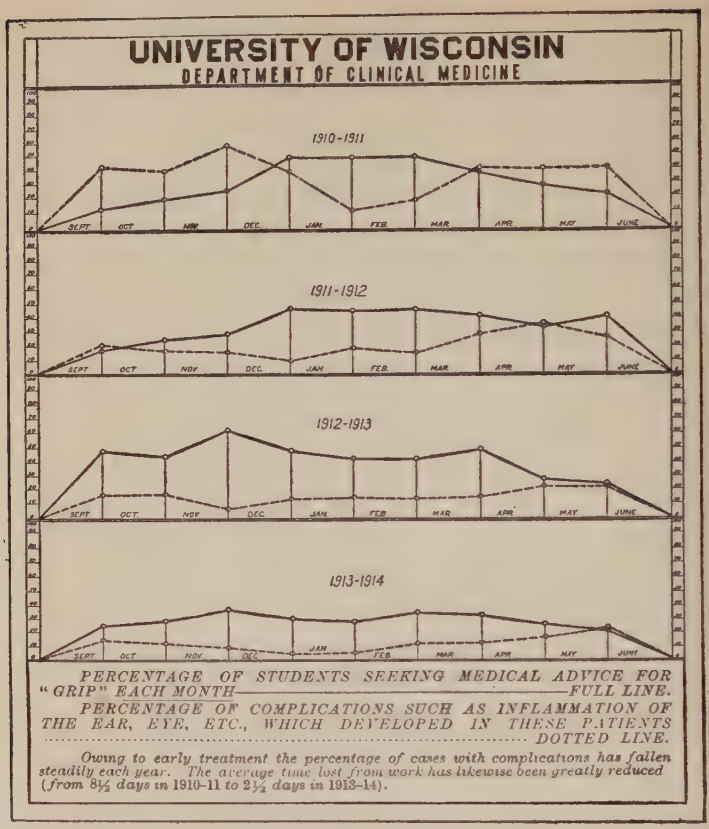
an epidemic of potential consequences,—and relief is sought early because in the University medical attention is not charged for separately. The following charts illustrate the beneficial effects of the work of the Department of Clinical Medicine of the University of Wisconsin.

Intellectual education must prepare for life. The problems of education are attracting increasing attention. Vocational training and guidance are needed, but the culture of the spirit must not be neglected. The modern problems of education are serious enough to tax the wisest brains we have.



PERCENTAGE OF STUDENTS IN ATTENDANCE AT THE UNIVERSITY SEEKING MEDICAL ADVICE EACH MONTH OF THE COLLEGE YEAR.

The percentage of students seeking medical advice has increased each year owing to the fact that the students have learned the value of reporting promptly to the office when ill. This has made possible early treatment of disease with a corresponding decrease in the amount of serious illness.


UNIVERSITY OF WISCONSIN
DEPARTMENT OF CLINICAL MEDICINE
1910-1911
1911-1912
1912-1913
1913-1914
SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUNE
PERCENTAGE OF STUDENTS SEEKING MEDICAL ADVICE FOR "GRIP" EACH MONTH——FULL LINE.
PERCENTAGE OF COMPLICATIONS SUCH AS INFLAMMATION OF THE EAR, EYE, ETC., WHICH DEVELOPED IN THESE PATIENTS ..... DOTTED LINE.
Owing to early treatment the percentage of cases with complications has fallen steadily each year. The average time lost from work has likewise been greatly reduced (from 8½ days in 1910-11 to 2½ days in 1913-14).

The need of moral education is now universally recognized. No educator of authority thinks that intellectual education alone is sufficient. Control must be strengthened and without discipline we cannot have the right kind of human resources. Here we have a strong reason for universal military service for those who are able to render such service. For those who cannot serve in the army or navy there should be physical training which should provide, so far as possible, all the advantages

Need of moral education.

of military training and fit those who receive it for some kind of social service, wherever this is possible. It is desirable that all young persons, young women included, should render a year's service to their country in some capacity. This is required to cultivate a sense of obligation and duty to counterbalance our overdeveloped sense of rights and to unite us into a firm, compact national body. In earlier days in the United States the life of the farm afforded discipline, now the large majority of children are being reared under urban conditions. Universal military service and other service such as is here advocated if wisely undertaken and carried out, will teach obedience, punctuality, industry, order, coöperation.

Finally, as a support to good morals, religious culture is needed. Notwithstanding the controversies in regard to religion, this need is increasingly recognized by all educators.

For the conservation of human resources, social provision must be made for those contingencies of life over which the individual has inadequate control. What we have here in mind is covered by insurance, which must continue to spread until it becomes universal. Few if any measures can do more to conserve human resources. For further consideration of the human resources, the reader is referred to Professor Carver's treatment in the present work.

Social insurance.

NATURAL RESOURCES

The natural resources are all concerned with the land, when we use land in the economic sense. It is to be noticed that the economists use the terms land and natural resources interchangeably. We are here concerned with those resources in the use of which economy is necessary or will become necessary in the future. In

Land policies.

other words, we have to do with scarcity goods or economic goods. Conservation policies are then land policies. The conservation policies of the United States mean American land policies.

When we think of land as meaning natural powers or natural resources, we soon discover that we have to do with a great multitude and variety of economic forces. The first step in any proper discussion of land policies must be a classification of land. The following is offered as a tentative classification which is sufficient for present purposes.

A. Classification with Respect to the Water-Supply

Classification of land.

Taking the world as a whole this is doubtless the most important of all classifications.

I. Land of the Arid Region

1. Irrigable land.
2. Timber land.
3. Pasture land.
4. Dry farming land.

This is the classification of Major J. W. Powell, the Geologist in Charge of the United States Geographical and Geological Survey of the Rocky Mountain Region, with dry-farming land added: and each one of these classes is capable of subclassification; and further subclassification is required as a necessary step in the framing of land policies.

II. Land of the Humid Region

In these regions lands are watered in the main and with approximate adequacy by rainfall, artificial watering playing a subordinate rôle. These are lands of the humid region.

The following classification under *B* and *C* is framed

mainly with reference to lands of the humid region, but not exclusively so, as it will be seen that it is in part applicable to lands of the arid region. The other classifications likewise are made from different points of view and apply very largely to both land regions.

B. I. Dead or waste land:—that is, land as not yet brought into use.

II. Living land:—land which has been made to live and bear fruit.

C. I. Land for sub-surface appropriation of natural gifts. We have here to do with mines.

II. Land for surface appropriation or utilization.

1. Land for appropriation of natural gifts.
   a. Natural forests.
   b. Natural pastures.
   c. Land with surface minerals, or placer-deposits.
2. Cultivated land.
   a. Agrarian landed property.
   b. Cultivated artificial forests.
3. Building sites.
4. Highways.
   a. Of general use.
   b. Of limited use.
5. Shore lands, including riparian rights.
6. Land under water.
7. Water.
   a. Running streams—brooks—rivers.
   b. Bodies of water without a strong current—ponds, lakes, seas, oceans, etc.

Another classification of water is into

a. Tidal waters.
b. Non-tidal waters.

D. I. Urban land.

II. Rural land.

1. Urban land.

This needs extensive classification in order to frame wisely land policies. A rough classification is as follows:—

1. Land used for mercantile purposes which is further subdivided into:
   a. Wholesale districts.
   b. Retail districts.
2. Manufacturing sections.
3. Dwelling zones which must be again subdivided with reference to the character of improvement.
4. Recreation land.

II. Rural land.

This has already been sufficiently classified for present purposes.

E. I. Land which indirectly ministers to man through material products, for example, agricultural land.

II. Land which directly serves man's needs.

1. Wild recreation land, for example, land which may be taken for such use from the government in Ontario, Canada, and privately owned. But much land of this kind is publicly owned also.
2. Artificial parks, privately or publicly owned.
3. Home lands, surrounding houses and making a part of the home.

F. Classification with respect to actual and desired forms of ownership.

I. Common ownership.

II. Private ownership.
    1. Individual.
    2. Collective, e. g., of corporations.
III. Public ownership.

G. Classification with respect to excellence.

I. Land of the first class.
II. Land of the second class, etc.

As population develops and utilization becomes more intensive, the quality classes should increase. In a country like the United States, there should be probably well over thirty quality classes. An advanced policy of limitation of private land ownership as in New Zealand must be based on such a classification. In New Zealand, the ultimate aim of land legislation is to limit the amount of arable land one person may own to four hundred acres of land of the first class. Obviously to limit area without reference to quality shows either heedlessness as in the United States laws concerning homesteads; or it indicates the absence of common sense; and in either case the results are disastrous.

Quality classes of land based on survey.

We can attempt to offer here and now only the barest sketch of an American land policy. An attempt is made suggestively to outline a framework within which conservation policies must be developed.

Framework of an American land policy.

Agricultural and arable land gives the best results when it is privately owned in suitable areas and when as a general rule the man who cultivates the land is its owner. The freehold has justified itself. Other experiments which have been tried have not been satisfactory. Very often they have not been capable of survival. We have here the testimony of many lands and many generations.

The freehold.

Tenancy is not to be altogether excluded, because it is needed as a rung on the agricultural ladder for those who are climbing upward and because also it is needed for those who have not the capacity for independent management and direction. There are very many who will make the best use of the land when they cultivate it as tenants under the direction of wise owners. The amount of tenancy which is desirable will depend upon historical conditions and the qualities of those classes making up the population. However hopeful one may be with respect to the future of the American negro, probably his wisest friends would say that in the vast majority of cases good tenancy is the best thing for him at the present time.

Tenancy.

While private ownership of land of this kind should be dominant, a large amount of public ownership is also desirable. When the State is well administered it may and, in fact, does make a good landlord, setting standards for other landlords. Publicly owned land is also needed for model farms and experimental stations.

The state as landlord.

One dominant consideration never to be overlooked is military defense. Oil-bearing lands afford illustration. Oil is indispensable as fuel for the navy, if the navy is to attain its highest efficiency. Now public ownership means direct and immediate control and such utilization without intermediaries as may be demanded at particular times and places. Consequently beyond all question there should be ample ownership by the United States of all oil-bearing lands which may be needed for the purpose of national defense, even if this includes all there are. All cases of doubt must here be resolved in favor of public ownership; and he is false to his trust who in public office neglects to act in accordance with this principle and fails to safeguard with all the power of his office and

Military defense.

personality the now publicly owned oil-bearing lands placed in any way under his control.

This same principle applies to other kinds of lands. Oil is used as an illustration of a general principle because the supply is peculiarly limited, because once gone it is gone for ever, and because it now plays so critical a rôle in the plans and purposes of the American Navy. As national preparedness enlarges its scope, we have an increasingly large demand for public ownership in an increasing number of fields.

Timber resources deserve careful consideration in this connection, but altogether apart from their importance in time of war, the experience of the world demands that public ownership and operation of forests should be dominant. After we have used up the timber in the natural forest, trees must be produced like any other crop. There are, however, peculiarities in this crop. If we are to get the highest results from a given area of land, plans must often be made for at least a century in advance of the present time. Ordinarily human beings have neither the ability nor the will to plan so far ahead. Not only are the returns slow but they are apt to be low when the best forest policy is pursued.

Public ownership of forests.

Quite as important as the foregoing considerations are others which will now be mentioned. A satisfactory forest policy means that the forests must be placed upon land which is especially adapted for them and which generally is not well adapted to other purposes. Frequently they must be vast in extent, covering entire mountain sides and following the sources of great streams. Often they must extend into several states. It is only through the action of our various governments coöperating together that forests can be made to cover all the land especially

adapted to them and the land where they are especially needed. All this is supported by the experience of the civilized world.

The mineral resources form a peculiar class. Our minerals are given us once and for all by nature and when the present supply is used up no new supply will be forthcoming. The problem of production falls away and we have to do simply with the problem of seizure, taking possession—called by the Romans *occupatio*.

Seizure of mineral resources.

Two conservation problems present themselves here in very striking manner. One is the problem of careful use with a proper balancing of present and future interests. The other problem is that of the distribution of wealth. The seizure by private individuals of minerals when they are subject to private ownership has led to the formation of mammoth fortunes, so vast as to be almost beyond human comprehension. Among the economists of the world there is probably a pretty general consensus of opinion as to what is a wise policy when we have to do with mineral resources still in public ownership. If prudent men with our experience were brought to a new world, they would doubtless lay it down as a part of their conservation policies that all mineral treasures should be publicly owned.

American conception of private property too expansive.

In America, we have fallaciously allowed an undue expansion of the idea of private property in land in such a way as to make the owner of the land owner of the air indefinitely upward and of the earth indefinitely downward. Conservation demands a separation of the ownership of the surface from what is above and what is below. The aim of the policies must be such as gradually to bring about as large an ownership of mineral treasures by society in its collective capacity as possible. In the case

of all mineral lands now publicly owned, the fee should be retained in public ownership.

We have undiscovered mineral treasures which we should seek to secure for public ownership. Various plans have been suggested for bringing this about. One is the separate taxation of the various strata of land. If a man claims that he has valuable mineral treasures, let him pay taxes upon these and let the State or some other public authority buy in at tax sales all land with valuable mineral treasures upon which the taxes are not paid. Another plan would be condemnation of mineral rights on land where minerals have not as yet been discovered. Where there is a real value this should be paid for because any policy of confiscation is inconsistent with conservation. Where minerals are as yet undiscovered there is practically no value for the private owner. This is the case because the chance of discovery on any one particular piece of land is so small. Nevertheless, we know that very valuable mineral treasures are as yet to be discovered.

Taxation of various strata of land.

The operation of mines should probably be mostly private, under conditions laid down in leases. Yet the experience of countries like New Zealand and Germany would show that for the sake of control at least a limited amount of public operation should be coupled with public ownership.

As the mineral treasures have so largely passed into private ownership, we must in any case have in our country mainly private operation and private ownership; certainly for a very long time to come. Fortunately, as is shown elsewhere in this work by Professor Leith, there is a greater degree of harmony between private and public interests than has

Great degree of harmony between private and public interest; yet social control necessary.

been supposed by the earlier writers on conservation. But when all this is conceded, it still will remain true that as time goes on, an increasing amount of social control will be necessary.

Water publicly owned with private beneficial use.

Water should be publicly owned with private beneficial use. Professor Carver has suggested the system of selling water rights by auction, the idea being that he who will pay the most will make the best use of the water. Something is to be said in favor of this system. Perhaps it is still better so to arrange water rights and so to connect them with the land that the water under suitable social regulation will naturally and spontaneously accomplish the largest results. All our American experience is in favor of a permanent connection of the land with the water, as a general rule with certain possible exceptions in the arid regions of the United States.

Shore lands ought to be in general publicly owned. Public ownership of this land is a part of the land policy of Ontario, Canada. There are doubtless cases when exclusive private beneficial use should be allowed, but the ultimate ownership should be public. The experience of cities like New York and Baltimore confirms this position and the failure to recognize the wisdom of the policy in earlier days has been productive of enormous costs and great waste.

Strategic shore lands.

Shore lands are strategic, as their ownership controls access for the lands further back to the water. Where any land has a peculiar strategic position it should be publicly owned.

For cities to avoid waste we need a large degree of control of privately owned land. Private ownership appears to accomplish the best results so far as the greater proportion of urban land is concerned, but the experience of the world increasingly favors a large amount of public owner-

ship. German cities have gone further in this direction than those of other countries, but the experience of American cities also is conclusive.

Many mistakes have been made on account of a failure to plan the development of cities wisely in advance. There is no city in America which has not suffered on this account. One of the most glaring instances of enormous waste is to be found in Superior, Wisconsin, a city with less than 50,000 inhabitants laid out on a scale for a city with a million inhabitants. Here we have enormous waste that can only gradually be remedied.

Waste in urban land policies.

It will be observed that the development of sound conservation policies means the complete abandonment of *laissez-faire;* and we again reach the conclusion taught by the experience of the world that the alternative to chaos and ruin is wise social control of land policies. We have to work together to avoid frightful waste of natural and human resources, to secure liberty and to achieve general prosperity. No better illustration can be afforded than that given by modern colonization; in other words, settlement of the land, as exemplified by the history of American landed property and in most recent times by the experience of California. Everywhere we find wasted fortunes, wasted human effort, blighted lives because the individual has failed, first, in selecting land wisely, secondly, in making satisfactory bargains with respect to price, rates of interest and time of payments, thirdly, in methods of cultivation, and, fourthly, in marketing his produce. No more abundant demonstration has ever been given of the enormous individual and social loss, resulting from this absence of wise social land policies, wisely controlled, than is given in the Report of the Commission on Land Colonization and Rural Credits of the

Results of laissez-faire.

Unsuccessful colonies in California.

State of California. The Commission consisted of the following members: Elwood Mead, Chairman, Harris Weinstock, David P. Barrows, Mortimer Fleishhacker, Chester Rowell, and David N. Morgan, Secretary, and is dated November 29, 1916. Thirty-two colonies or projects were investigated and not one has proved wholly successful from the social point of view, while many have been dismal social failures. A few pertinent quotations follow:

"Organization in the development of a colony and preliminary training or direction of settlers are as valuable as is the preliminary training of workmen in their duties in a great industrial undertaking.

"*Conditions of Land Selling Contracts in California Should be More Liberal*

"The comparison of land prices and conditions of payment here and in other countries raises the question, 'How it is possible for settlers in California to pay for farms in periods of from three to ten years, while in other countries periods of from thirty to seventy-five years have been found necessary.' The answer is that in California the settler who has not had a large cash capital or some outside income *has not been able to purchase a farm.* We have not found a single settler who, bringing with him only the limited capital accepted by state systems in other countries, has been able to pay for his land in the time agreed upon in his contract.

Settlers unable to purchase farms.

"The inability of settlers to meet their payments in these different colonies does not necessarily mean that the land is not valuable for agriculture or horticulture or that, in most cases, it is not worth the price asked for it. What it does mean is that we have been carrying on colonization enterprises on an impossible financial

Successful experience in other countries.

plan. If the settlers in these colonies where the soil is good and the water supply satisfactory, had been given the time, the interest rate, and the assistance in other directions given settlers in Denmark, Ireland, Germany, or Australia, the percentage of successes here would have been as large as in those countries.

"Some credit system more liberal than that of the Federal Farm Loan Act or that provided by colonization enterprises is therefore indispensable if we are to attract and retain many homeseekers who have all the elements of experience and character essential to success but who, lacking capital, must depend on their frugality and industry to earn the money to pay for their homes.

"It has been pointed out by various witnesses that the underlying causes for much of the failure of our colonization schemes are as follows: First, the selection of unfit land; second, the selection of unfit settlers; third, ignorance on the part of the promoters of land colonization as to proper colonization methods, and ignorance on the part of many of the settlers or homeseekers in knowing how to plant, what to plant, and when to plant it; fourth, the excessive cost of land; fifth, insufficient capital on the part of the settlers; sixth, excessive rates of interest on borrowed money or on deferred payments; seventh, short term payments that would embarrass the settlers who were unable to meet their obligations; and eighth, improper marketing facilities.

Causes of failure in our colonization.

"We can not go on creating bad conditions of life and seeking people who are indifferent to those conditions without destroying our rural civilization. When we read of the German organizations providing little plots of ground for the laborers, and building them comfortable and sanitary houses at the cost of $1,000;

Homes for laborers and farmers.

when we read of one Australian state far poorer than California and with less than half our population providing 6,000 homes for laborers and 4,000 houses for farmers; we realize how far we have fallen behind the rest of the world in our understanding of rural needs and in our measures to elevate rural society.

"Private companies will not give the terms of Denmark, Germany, or Australia until it has been demonstrated here that such terms can be given with safety. They will not provide homes for farm laborers until shown that these homes will be paid for and be a community asset. No country has adopted modern settlement methods until its government took the initiative and showed the value of them. We can not expect California to be an exception.

Government must take initiative.

"In the past settlers and land settlement have been helped by the large increase in land prices which accompanied development. This made it possible to borrow money for improvements or to sell a part of the original purchase for nearly the first cost of the whole area. This aid can not be relied upon in the future and we must replace it by a more generous personal credit system and by introducing more efficient and cheaper methods of preparing farms for intensive cultivation.

Credit system.

"The state which blazes the trail in scientific colonization will secure a prominence and establish a moral leadership that will be of great value in attracting desirable settlers. No state has more to gain from such leadership than has California. A concrete working example in this state of the methods and policies which have transformed rural life and immensely improved agricultural practices in Denmark, Ireland, Germany, Australia, and New Zealand would do more than

California should transform its methods, and avoid alien land tenantry.

any other single influence to insure future agricultural progress along right lines. In no other way can the owners of large estates be so effectively shown what to do and what to avoid. In no other way can the present tendency to create here a great alien land tenantry be more certainly checked. If the state were to purchase, subdivide, and settle 10,000 acres, its action would be watched by the whole world. It is entirely feasible to make this educational demonstration commercially profitable. It can be made to pay its way, so as to cost the taxpayer nothing. Such result has been achieved in the countries whose state systems have been held up as examples; there is no reason to doubt our ability to be equally efficient and successful.

"These departures from the methods and policies under which the state has reached its present wealth and greatness are in accordance with the changing tendencies of our time. Before the beginning of the present war and more rapidly since its beginning the leading nations of the world are organizing all their resources and their industries, so as to eliminate waste, promote efficiency and give the broadest possible diffusion of opportunities. Making settlement a public matter and using the wisdom and experience of the world in shaping our methods and policies will not only attract people here, but will do more to make California a desirable place to live in and secure a better use of our resources than can be accomplished in any other way."

The lesson of the European War.

These quotations represent the fruits of careful, deliberate investigation of a commission headed by one of the ablest, most experienced experts in land policies known to the United States, a man who with native gifts, well-trained, has devoted many years of study to land problems in our own and other countries.

This is only the barest outline of conservation policies for our natural resources. It suggests the lines along which we should move. To develop fully the thoughts that are here sketched would require so much space as to fill a very large volume. But we want to emphasize that whenever we discuss any modern social problem we always come back to the need of a higher political organization than that which we now have. We cannot solve our problems of conservation any more than we can other social problems unless we get a new idea of organized political society, its nature and its functions. We must in some way bring it about that men of the highest talents shall devote themselves for life to the public service. We have as yet hardly begun to think of progressive policies in terms of the twentieth century, but are still working with eighteenth century ideas, and fancying ourselves progressive when we are in reality reactionary. The watchwords of twentieth century progressivism must be *Organization*, *Integration*, *Trained Leadership*.

Higher political organization necessary.

We close with one very practical suggestion. It is only through a conservation commission or various conservation commissions—for several may be required—that we can put in force conservation. Legislation can never solve these complex problems, but can simply lay down the general principles, expressive of the will of the legislature; and in concrete cases the commission must make the application of principles, in other words, ascertain the will of the legislature. The commission must ascertain what is excessive present use and what is waste, must in concrete cases weigh over against each other present and future, must decide upon the burden to be imposed on private property under the police power, and upon compensa-

The power of legislation very limited. Its scope considered. Administrative commissions alone equal to the tasks of conservation.

tion which is feasible and required; it must set limits to the sacrifices which may be legally and ethically exacted of the individual and the private corporation.[1] From time to time, it will have to recommend the establishment of new principles by legislation; and the courts, as having the last word in social progress, will review certain decisions.

But the great burden must rest with commissions clothed with large executive and quasi-judicial powers such as the great Wisconsin Commissions have, for example, the Railroad Commission and the Industrial Commission. And do not commissions give us the democratic solution of the complex economic problems of our day? The legislature lays down the principles, and if the commissions furnish men with careers, with honor, the public may command as well-trained capacity and as high talent as the greatest private corporations and for far less cost. Recognition, the development of democratic sources of honor, open careers to capacity and talent—all these will draw to the service of the people men who will be equal to the tasks of government, and who in their own persons will illustrate the nobility of social service and make men proud to say: "I am a civil servant."

[1] On the sense of social responsibility in its relation to conservation and the sacrifices to be enforced by law on the individual and the private corporation *v.* Van Hise, id., pp. 362–3; 374–5; 377. Possibly President Van Hise exacts too much of the private individual.

APPENDIX

NOTES

1. p. 7. When the writer took up Dr. Gifford Pinchot's work, entitled *The Fight for Conservation*, the book by chance opened at page 110 where this passage occurs:

"The conservation issue is a moral issue. When a few men get possession of one of the necessaries of life, either through ownership of a natural resource or through unfair business methods, and use that control to extort undue profits, as in the recent cases of the Sugar Trust and the beef-packers, they injure the average man without good reason, and they are guilty of a moral wrong. It does not matter whether the undue profit comes through stifling competition by rebates or other crooked devices, through corruption of public officials, or through seizing and monopolizing resources which belong to the people. The result is always the same—a toll levied on the cost of living through special privilege."

2. p. 10. A priority as used in the irrigated sections of the United States refers to the right to the use of water with respect to the superior or inferior time-rights of others. Thus priority number one means the first right in point of time, priority number two means the second right in point of time, etc. Priorities may run up into the hundreds. While the word may not be very good English, it is thoroughly established in law and popular usage. The following quotation from Mr. F. H. Newell's book *Irrigation* (1902 edition) will help the reader, not familiar with irrigated agriculture, to understand the concept.

"Under federal statutes and state laws the use of the water is guaranteed to certain individuals to the extent to which they put it to beneficial use, and usually in the order in which they have thus employed the water. In theory, at least, the man who first irrigated ten acres should continue indefinitely to have enough water for his 10 acres, while the man who next irrigated 20 acres can have sufficient water for his area only when it is apparent that the first man can also have his share; and so on, each person receiving an amount of water sufficient for the needs of his cultivated tract in the order in which this was put under irrigation.

"This is known as the law of priorities. In theory it is extremely simple and just, but in practice it may be very complex, and its operations apparently unfair. For example, after a country has been settled for a generation or more, there does not seem to be any good reason why a certain individual, who perhaps may be the poorest farmer of the community, should always have ample water simply because the man from whom he purchased or inherited his farm happened to take out and apply water a few days or months before his neighbors did.

"A strict determination of priorities also leads to waste of water, as the earliest settlers may have been located at considerable intervals along a stream, 10 or even 50 miles apart, and on the lower, poorer lands, and so situated that water can be taken to them in small quantities only at great expense and loss of volume. As the country develops, and every drop of water is needed, the equities seem to demand that the priorities which at first were fair and just should give way to the largest and best use of the flowing streams. Ten men should not be deprived of the use of the life-giving fluid to satisfy the claims of a single individual."

Now as the rule has obtained "first in time, first in right," priorities are distributed very wastefully. The first priority may be near the mouth of a stream, and the later priorities are apt to be near the source. This means that those near the source are obliged to see the water flow perhaps a hundred miles down the stream to satisfy earlier priorities while their crops are being parched. Even if this involved no waste of water by evaporation and seepage, it would be hard for human nature to resist the temptation to divert and steal the water; but the waste is great. To make the most of this water, the water should be diverted as the water goes down the stream, the water first diverted returning in considerable part to the stream to be used again by those farther down. Now in the "Reclamation Projects" of the United States Government, those entering into them have been obliged to give up their priorities in order to have them reassigned in such a way as to enable the available supply of water to accomplish larger and better results. No thorough-going solution of the problems of irrigation is possible which does not involve a rearrangement of property rights. Now and here it is not desirable to enter further into this complicated subject; but the reader is referred to the forthcoming book of Professor Elwood Mead, *The Economics of Irrigation*, to appear in Macmillan's Social Science Text Book Series.

3. p. 12. Friedrich List develops his theory in his *National System of Political Economy*, first published in 1841, (Nationales System der politischen Ökonomie). The distinctive feature of List's work is his development of the theory of productive powers as distinguished from the theory of present values and his application of this theory of productive powers to the question of free trade and protection, thereby giving us one of the ablest defences of a

protective tariff which have as yet appeared. His theory is an evolutionary one, because he finds that there are certain stages in economic development, and that each one requires its own appropriate tariff policy.

While his book deals primarily with the development of manufactures through appropriate tariff policies, his theory of productive powers is easily and naturally extended so as to find application to conservation. List considers not only present production, but he regards of still more importance the development of productive powers for the future; and conservation means a careful regard for productive powers in the future as well as in the present. There can be little doubt that in criticising the neglect of production by the English economists List has put his fingers upon one of their greatest weaknesses, and one which has resulted in great losses in English-speaking countries. Perhaps the more careful treatment of productive forces by German economists is one of their strongest features, and undoubtedly they owe a great deal to List.

The following quotations from List, Chapter twelve, in Sampson S. Lloyd's English translation of List's *National System of Political Economy* are especially pertinent in this connection:

"Adam Smith's celebrated work is entitled,'The Nature and Causes of the Wealth of Nations.' The founder of the prevailing economical school has therein indicated the double point of view from which the economy of nations, like that of private separate individuals, should be regarded.

"*The causes of wealth* are something totally different from *wealth itself*. A person may possess wealth, i. e., exchangeable value; if, however, he does not possess the power of producing objects of more value than he consumes, he will become poorer. A person may be poor; if he, how-

ever, possesses the power of producing a larger amount of valuable articles than he consumes, he becomes rich.

"*The power of producing wealth* is therefore infinitely more important than *wealth itself;* it insures not only the possession and the increase of what has been gained, but also the replacement of what has been lost. This is still more the case with entire nations (who cannot live out of mere rentals) than with private individuals. Germany has been devastated in every century by pestilence, by famine, or by civil or foreign wars; she has, nevertheless, always retained a great portion of her powers of production, and has thus quickly reattained some degree of prosperity. . . .

". . . That Smith's school teaches nothing else than the theory of values, is not only seen from the fact that it bases its doctrine everywhere on the conception of 'value of exchange,' but also from the definition which it gives of its doctrine. It is (says J. B. Say) that science which teaches how riches, or exchangeable values, are produced, distributed, and consumed. This is undoubtedly not the science which teaches how the *productive powers* are awakened and developed, and how they become repressed and destroyed. M'Culloch calls it explicitly '*the science of values*,' and recent English writers '*the science of exchange*'.

"Examples from private economy will best illustrate the difference between the theory of productive powers and the theory of values.

"Let us suppose the case of two fathers of families, both being landed proprietors, each of whom saves yearly 1,000 thalers and has five sons. The one puts out his savings at interest, and keeps his sons at common hard work, while the other employs his savings in educating two of his sons as skilful and intelligent landowners, and in enabling the other three to learn a trade after their respective tastes;

the former acts according to the theory of values, the latter according to the theory of productive powers. The first at his death may prove much richer than the second in mere exchangeable value, but it is quite otherwise as respects productive powers. The estate of the latter is divided into two parts, and every part will by the aid of improved management yield as much total produce as the whole did before; while the remaining three sons have by their talents obtained abundant means of maintenance. The landed property of the former will be divided into five parts, and every part will be worked in as bad a manner as the whole was heretofore. In the latter family a mass of different mental forces and talents is awakened and cultivated, which will increase from generation to generation, every succeeding generation possessing more power of obtaining material wealth than the preceding one, while in the former family stupidity and poverty must increase with the diminution of the shares in the landed property. So the slaveholder increases by slavebreeding the sum of his values of exchange, but he ruins the productive forces of future generations. All expenditure in the instruction of youth, the promotion of justice, defence of nations, etc., is a consumption of present values for the behoof of the productive powers. The greatest portion of the consumption of a nation is used for the education of the future generations, for promotion and nourishment of the future national productive powers.

"The Christian religion, monogamy, abolition of slavery and of vassalage, hereditability of the throne, invention of printing, of the press, of the postal system, of money, weights and measures, of the calendar, of watches, of police, the introduction of the principle of freehold property, of means of transport, are rich sources of productive power.

To be convinced of this, we need only compare the condition of the European states with that of the Asiatic ones. In order duly to estimate the influence which liberty of thought and conscience has on the productive forces of nations, we need only read the history of England and then that of Spain. The publicity of the administration of justice, trial by jury, parliamentary legislation, public control of State administration, self-administration of the commonalties and municipalities, liberty of the press, liberty of association for useful purposes, impart to the citizens of constitutional states, as also to their public functionaries, a degree of energy and power which can hardly be produced by other means. We can scarcely conceive of any law or any public legal decision which would not exercise a greater or smaller influence on the increase or decrease of the productive power of the nation.[1]

"If we consider merely bodily labour as the cause of wealth, how can we then explain why modern nations are incomparably richer, more populous, more powerful, and prosperous than the nations of ancient times? The ancient nations employed (in proportion to the whole population) infinitely more hands, the work was much harder, each individual possessed much more land, and yet the masses were much worse fed and clothed than is the case in modern nations. In order to explain these phenomena, we must refer to the progress which has been made in the course of the last thousand years in sciences and arts, domestic and public regulations, cultivation of the mind and capabilities of production. The present state of the nations is the re-

[1] Say states in his *Economie Politique Pratique*, vol. iii, p. 242, "Les lois ne peuvent pas creer des richesses." Certainly they cannot do this, but they create productive power, which is more important than riches, i. e., than possession of values of exchange.

sult of the accumulation of all discoveries, inventions, improvements, perfections, and exertions of all generations which have lived before us; they form the *mental capital of the present human race*, and every separate nation is productive only in the proportion in which it has known how to appropriate these attainments of former generations and to increase them by its own acquirements, in which the natural capabilities of its territory, its extent and geographical position, its population and political power, have been able to develop as completely and symmetrically as possible all sources of wealth within its boundaries, and to extend its moral, intellectual, commercial, and political influence over less advanced nations and especially over the affairs of the world." [1]

4. p. 22. Dr. Felix Regnault entertains the view that the decadence of Greece, Rome, Spain and Italy has been due primarily to a failure to practice conservation. The following extracts from an article of his translated and printed in the Annual Report of the Smithsonian Institution for 1914 give his position with respect to Greece and also his general conclusion.

"The persistent decadence of certain peoples is at present attributed to depopulation, deforestation, and malaria. How can these so widely divergent factors be brought into interrelation? To understand it, geology, sylviculture, and medicine must be interrogated.

"In the period of her greatness Greece was a fertile, well wooded, healthful, and very populous country, estimated by historians to have had at least 8,000,000 inhabitants.

"Two centuries later, at the time of the Roman con-

[1] *The National System of Political Economy* by Friedrich List. Translated from the original German by Sampson S. Lloyd, M. P. Longmans, Green and Co., London, 1885.

quest, the mightiest cities of Greece and the most important leagues could place only a few thousand soldiers in the field, and entire Hellas, according to Plutarch, could equip not more than 3,000 fully armed troops. The country became poor. . . .

"Historians ascribe the depopulation of Hellas to a continuously increasing emigration of adult inhabitants. Since the fourth century B. C. they went forth in throngs to foreign regions as mercenaries; the conquests of Alexander the Great precipitated this exodus and dispersed Greece over the surface of Asia.

"Low birth rate probably also played an important part, but we are poorly informed on this subject. . . .

"Deforestation was a result of the depopulation of the countrysides. In fact, the cultivation of the soil, which the lack of laborers rendered impossible, was replaced by exploiting the elevations, since a few men could superintend immense herds and drive them every summer into the mountains, while the dried-up plain could not support them. The pasturage would not have entailed waste if it had been rationally regulated. But the ignorant and avaricious proprietors overburdened the pastures; the too numerous cattle devoured the herbs down to the roots, trampling and destroying them. With each year the pastures grew more impoverished. To feed a herd which was always so numerous, it was driven into the woods, where the cattle browsed on the young roots, the seedlings—all the future trees. In the long run the old trees perished; occasionally the cattlemen hastened their end by setting them on fire. Then desolation began. The water, no longer held in place by the trees and turf, rushed tearing down the slopes, carrying away the entire vegetable soil; it was the death of the mountains.

"With deforestation, malaria developed. Mr. Rose claimed that the Anophele mosquito had been imported into Greece from a foreign land, probably from Egypt. M. Cawadias [1] has demonstrated that swamp fever had always raged in Hellas. At first its area was limited, but deforestation favored its extension. This, in fact, renders the run of rivers unequal. In summer, when there is no flow, the river beds still in places contain pools favorable to the breeding of mosquitoes. It is in this way that the plain of Argos, once healthy and fertile, is ravaged by malaria. On the other hand, silt is deposited at the mouths of the streams, forming vast marshy plains, where the Anophele develops.

"The condition of the lakes was altered. The detritus carried by the water over the deforested slopes choked the outlets of the lakes and kept the water on a nearly constant level. Besides, there are long intervals between the high-water and low-water levels, and during the latter period the marshy banks become favorite nests of the Anopheles.

"Finally, as another consequence of deforestation, new lakes are formed by the movement of subterranean waters and the breaking up or subsidence of the soil, which are subject to the same conditions and thus produce malaria.

"At present Greece has a high birth rate, but since she can not support all her children, they emigrate in large numbers, for the old devastations persist, and innumerable herds perpetuate the work of destruction. During every summer malaria rages. Only the Ionian Islands, which have always remained wooded, rich, and densely populated, can convey an idea of what ancient Greece once was.[2]

[1] A. Cawadias, La Paludisme dans l'histoire de l'ancienne Grèce. (Bull. Soc. Fr. histoire de la Médicine, 1909, pp. 158–165.)

[2] I have furnished numerous facts in support of this theory in "La décadence de la Grèce expliquée par la déforestation et l'impaludisme" (Presse

"Devastating wars, unjust laws, low morals, depopulation following upon a low birth rate or intense emigration—all these factors, which are often cited by historians to explain decadence, are but passing causes. As long as the richness of the soil is not destroyed prosperity can rapidly return, and the instances of these fluctuations in the greatness of peoples are not rare in history.

"But reforestation, restoration of vegetal earth on a denuded soil, turning torrents into peaceful watercourses; the drainage and sanitation of the swamps—these are works which require centuries of constant and devoted labor, the sacrifice of numerous generations. Thus Greece, Italy, and Spain continually suffer from those evils which a single improvident generation could cause, but which are so difficult to combat."

Dr. Regnault elaborates his view with respect to Rome, Spain and Italy in the article from which the above quotation is taken.

For confirmation of this view the reader is referred to the scholarly and very noteworthy researches of Dr. Vladimir G. Simkhovitch as presented in his article "Rome's Fall Reconsidered" which appeared in the Political Science Quarterly for June, 1916. The following quotation gives Dr. Simkhovitch's conclusion (pp. 241–242):—

"It is claimed that there is but one understanding; the misunderstandings are legion. To guard against misunderstandings is impossible. Yet I know that many a charitable reader will sympathetically suggest that while the exhaustion of Roman soil was an important factor, I can hardly mean to insist that it was *the* sole factor responsible for Roman decline and fall. For it is not credible that so

mèdicale, Sept. 22, 1909, No. 76), and "Le déboisement et la malarie en Grèce" (Le Naturaliste, Paris, 1910, p. 262).

rich and so complex a texture of life should depend upon one single and solitary factor.

"Such would not be my assertion, nor is it my attempt. I have not undertaken to explain the complex fabric of Roman life; we are dealing here with the relatively simple problem of its disintegration. All that this study shows is that the progressive exhaustion of the soil was quite sufficient to doom Rome, as lack of oxygen in the air would doom the strongest living being. His moral or immoral character, his strength or his weakness, his genius or his mental defects, would not affect the circumstances of his death: he would have lived had he had oxygen; he died because he had none. But it must be remembered that while the presence of oxygen *does not explain his life*, the absence of it is sufficient to explain his death.

"There is one other misunderstanding which I should like to guard against. So far as argumentation is concerned, this essay might be considered a continuation to the study published some time ago, dealing with the medieval village community.[1] The reader will find there this statement:

"Go to the ruins of ancient and rich civilizations in Asia Minor, Northern Africa or elsewhere. Look at the unpeopled valleys, at the dead and buried cities, and you can decipher there the promise and the prophecy that the law of soil exhaustion held in store for all of us. It is but the story of an abandoned farm on a gigantic scale. Depleted of humus by constant cropping, land could no longer reward labor and support life; so the people abandoned it. Deserted, it became a desert; the light soil was washed by the rain and blown around by shifting winds." [2]

[1] Simkhovitch: "Hay and History." *Political Science Quarterly*, vol. xxviii, pp. 385–403, September, 1913.

[2] Simkhovitch: *op. cit.*, p. 400.

5. p. 30. It is the high price of land rather than the high price of the products from the land that is the cause of good and intensive farming. It is important to bear this distinction in mind. In all cases where there is opportunity for expanding the farm area at old prices for purchase or rent the first movement is likely to be in the direction of more extensive farming. This is illustrated by what has happened in a concrete case in western Canada which has been brought to the attention of the writer, where a prosperous young farmer has increased his area very greatly on account of high price, but has even decreased somewhat the intensivity of his culture. The same situation is observed in and about many small cities in this country in the increased area of gardens, but it is equally true that those farmers who are unable to increase their area will be led by high price to more intensive culture, unless the high price should be counterbalanced by high wages and high interest on capital. If permanent, high prices must necessarily be reflected in higher land values, other things being equal. Historically and generally the two go together.

We are really dealing with a question of proportions in which the various factors of production are mingled. That which is scarce and precious relatively receives an increased application of the other factors. If land becomes relatively more scarce as compared with labor and capital, more labor and capital will be mingled with it and cultivation will become more intensive.

6. p. 33. An illustration of the principle is afforded by the Report made by Mr. J. L. Dunlop on "Secondary Metals," forming Part I of the public document "Mineral Resources of the United States, 1915" prepared as a part of the work of the United States Geological Survey. Note as "Secondary Metals" is a term used to designate metals

"recovered from scrap metal, sweepings, skimmings and drosses, and are so-called to distinguish them from the metals derived from ore which are termed 'primary metals'" we have in the use of these metals, an excellent opportunity to test what is waste and what is not waste and to see how largely this is determined by price, because metals are mainly employed by large producers, who are in a superior position to analyze their operations and to measure economic effects. The following are pertinent quotations from Mr. Dunlop's Report:

"The high prevailing prices for nearly all metals and the scarcity at times of spot metals in 1915 had the effect of making users of metal increase their efforts to save scrap and other waste. It is reasonable to assume that, with copper worth double, zinc worth three times, and antimony worth eight times the normal values, more care was taken to save and properly segregate the metals. The employment of chemists by large manufacturers is not unusual, and general and satisfactory use of scrap metals has been brought about by more careful attention to details in assaying and in smelting practice. The economic sin of using a high-priced metal or alloy when a lower priced one gives equally satisfactory service is much more rare than formerly. Moreover, there are now many careful and responsible dealers in and refiners of scrap metals, many plants treating secondary material only, which compare favorably in size and quality of production with smelters treating ores, and the general plane of business integrity of the small dealers is on the whole as high as in other branches of trade.

"It is not the large manufacturer but the individual housekeeper and the small tradesman who are responsible for the opinion that the inhabitants of the United States are the most wasteful in the world. Paper, twine, rags, rubber,

and other so-called refuse are burned or are indiscriminately mixed and dumped out so that their recovery is rendered more difficult and their value is depreciated. To give one instance of metal waste which appears small and unimportant: tin, lead, and aluminum foil are discarded every day in nearly every household and store. Probably not one-tenth of the tin or other foil made is ever reused, though such foil can be made only from the purest metal.

"The increased recoveries of secondary tin, lead, and aluminum were those normally to be expected with much-improved business conditions. The high prices of metals made it necessary or advisable for many consumers, who formerly had always used virgin metals, to purchase scrap material.

"The following article, 'Growing Value of the Nonferrous Scrap Pile,' [1] shows the methods and extent of the recovery and re-use of metals by railways:

"'The modern brass foundry has always been considered a fertile field for the development of systematized reclamation of waste materials, but it has required a phenomenal rise in the price of nonferrous scrap to bring home to many manufacturers the real importance of saving every particle of metal that can be recovered economically. An example of the extent to which scrap may be utilized or turned to good account is furnished by the practice in vogue at the brass foundry of the Pennsylvania Railroad at Altoona, Pa. . . .

"'The price of scrap and the cost of reclaiming it are the two factors governing the extent to which recovery of metals may be carried with economy. Until the recent high prices of nonferrous metals and alloys, it was question-

[1] *The Foundry*, June, 1916, pp. 227–228.

able whether the extensive efforts to reclaim brass from sweepings and from other small sources was a paying procedure in many shops. In too many cases the cost of labor more than offset the value of the materials saved. Existing conditions in the old-metal market have changed this, and at the present time, perhaps as never before, there is good reason for waging war against the waste of scrap material with unusual thoroughness.'"

7. p. 35. Professor Gray in his article already referred to in the *Quarterly Journal of Economics*, gives the following classification of natural resources:

"Natural resources may be classified as follows:—

"I. Resources which exist in such abundance that there is no apparent necessity for economy, either in present or future. For instance, water in some localities.

"II. Resources which will probably become scarce in the remote future, although so abundant as to have no market value in the present. For instance, building stone and sand in some localities.

"III. Resources which have a present scarcity,—

"1. Not exhaustible through normal use: water-powers.

"2. Necessarily exhausted through use, and non-restorable after exhaustion: mineral deposits.

"3. Necessarily exhausted through use, but restorable: forests, fish.

"4. Exhaustible in a given locality but restorable through the employment of other resources of a different kind or of similar resources in different locations: agricultural land" [1] (pp. 499–500).

[1] In a footnote Professor Gray says, "In terminology the above classification resembles one proposed some years ago by Professor B. E. Fernow;

8. p. 40. "In periods of scarcity and high prices, therefore, the total demand for food may conceivably be lessened appreciably without limiting actual consumption, if only waste be eliminated. Complete eradication of waste is, of course, not to be expected, as habits of consumption change but slowly. There is neither the disposition nor the information for the accomplishment of this end. There is a very trite saying that a French family can live on what the average American family wastes. If this be true there can be decidedly greater elasticity of demand with reference to food in America than in France. Professor W. O. Atwater estimated, in 1894, more conservatively, the excess of waste in American as compared with European families at 5 per cent to 10 per cent. According to recent government investigations the waste in families in the United States with incomes of less than $800 per annum amounts to 3 per cent to 4 per cent, while in the case of families with incomes between $1,000 and $3,000 the waste frequently amounts to 10 per cent to 25 per cent.

"Quite as important as waste in the family, perhaps, is the waste in the marketing of produce—not to speak of the waste in the harvesting of farm products. To take a single illustration, it is estimated that the loss by breakage and wastage in the marketing of eggs in the United States amounts to $50,000,000 annually. There is also the waste in food that occurs through overeating—no small item in a country like our own." [1]

Especially noteworthy is the following extract from the statement on "The Food Situation of the Country" issued

see his *Economics of Forestry* (p. 10). In detail, however, the classification differs widely" (p. 500.)

[1] John G. Thompson's article, "The Nature of Demand for Agricultural Products and Some Important Consequences," *Journal of Political Economy*, vol. XXIV, no. 2, Feb., 1916, p. 163.

by Secretary of Agriculture, Honorable D. F. Houston under date of March 3, 1917.

"For partial immediate relief, every individual and community should consider earnestly the matter of food conservation and the limitation of waste. As a nation we seem to have a disdain of economizing. In many homes there is a strong feeling that it is 'only decent' to provide more food than will be eaten and that it is demeaning to reckon closely. The experts of the Department of Agriculture report to me that the dietary studies made by them point to an annual food waste of about $700,000,000. Of course, the waste in families of very limited means is slight, but in the families of moderate and ample means the waste is considerable. Even if the estimate were reduced by half, the waste would still be enormous.

"The food waste in the household, the experts assert, results in large measure from bad preparation and bad cooking, from improper care and handling, and, in well-to-do families, from serving an undue number of courses and an over-abundant supply and failing to save and utilize the food not consumed. As an instance of improper handling, it is discovered that in the preparation of potatoes 20 per cent of the edible portion in many cases is discarded."

9. p. 43. The following extract from the Pennsylvania Railroad System leaflet "System" illustrates what can be accomplished by proper organization in the prevention of fires. Evidently the expense must have been very small in proportion to the loss which was averted and the total gain must have been very great. It suggests furthermore that one of the most urgent needs in the United States is better organization of both private and public business as the means of lessening waste.

"As a result of thorough drilling and instruction in fire

fighting methods, together with the use of modern extinguishing apparatus, employes of the Pennsylvania Railroad System, in 1916, were enabled, by prompt action, to save more than $14,000,000 worth of the Company's property from destruction by the flames. This is shown by the Annual Report of Fires Extinguished, which has just been compiled by the Insurance Department, covering the Lines both East and West of Pittsburgh.

"Altogether, employes of the Railroad extinguished 385 fires, during the year, before the arrival of the public fire companies. The total loss sustained in these fires was only $16,437.42, while the value of the property endangered was $14,526,481. The average loss sustained was a little more than one-tenth of one per cent.

"Regularly organized fire brigades among employes extinguished 90 fires, holding the total loss down to $5,223.98. The property threatened was valued at $7,527,732. One-hundred and eleven fires were extinguished by individual employes, the total loss being less than $3,000, while the property at risk was valued at nearly $2,230,000. Locomotive fire apparatus was instrumental in checking 23 fires, at a total loss of $1,200. Water casks and fire pails were used in putting out 92 fires with such promptness that the destruction amounted to less than $1,500, although the property in danger was worth nearly $2,200,000. Chemical extinguishers were utilized in checking 46 fires and keeping the loss down to $1,300 on property valued in excess of $1,000,000. High pressure fire lines, installed by the Railroad upon its own property, were utilized in 8 fires, which were extinguished at a total loss of $1,400 on property having a value of more than $1,900,000. Chemical engines, tetra-chloride extinguishers, Company fire hose and automatic sprinkler systems, installed by the Railroad,

played a part in the early checking of 15 other fires, in which a total loss of $2,600 was sustained on property valued at $550,000." [1]

10. p. 50. While the writer takes a distinct position in favor of public medicine, he must not be understood as saying that the public service should always be gratuitous. It is still open to question to what extent public education should be a gratuitous service. In the University of Wisconsin the tuition and incidental fees for non-resident students amount at the present time to $149 per annum, but to state students the charge is $24 per annum and called an incidental fee. It is generally felt by the professors in the University that this discrimination between resident and non-resident students is unwise. This is not the place to enter into a discussion of this particular topic. It is not clear, however, to the present writer that higher charges for resident students would not be a measure of justice and also have some desirable effects upon the student body, provided higher charges were accompanied with generous provision for poor students of real capacity. Too often what comes easy is valued accordingly. So far as the writer can judge, no state university has a more loyal body of alumni than the University of Wisconsin, but it is the general belief of professors who have taught in endowed institutions, like Harvard, Yale and Columbia, where high fees are exacted, that there is a greater loyalty in these latter institutions and a greater readiness to make generous contributions to them. One must not speak dogmatically upon this subject because many historical conditions have to be examined before safe conclusions can be reached. It is desired here and now simply to make it plain that the question of public service is one thing and gratuitous

[1] Issued as circular letter, dated Jan. 28, 1917.

service another. Doubtless there are still stronger reasons for making charges in the case of public medicine than in the case of education. However, the charges made should be of such a character as not to deter people from seeking the medical and surgical relief which they need. The lesson taught by the experience of the Medical Clinic of the University of Wisconsin is precisely this, that the people should be encouraged in every way to seek timely relief. Sometimes even a small charge keeps poor people from providing themselves with those things which should be regarded as necessities. This is one objection to the cafetaria plan of boarding for it is to be feared that poor students, as well as other poor people, frequently fail to provide themselves with the amount of food which would be best for them, because every additional dish costs an additional sum. On this account a boarding house plan is better, provided that the boarding house gives a sufficient amount of nourishing and well cooked food for a definite price. Something like the boarding house plan should be worked out for medicine. Perhaps a very small charge might not prove an undue deterrent. However, the writer's purpose here and now is not to work out details which would require careful consideration by experts, but rather to lay down the general principles involved.

The Wisconsin legislature of 1917 has taken another important step forward in the direction of public medicine. In the laws of 1917, Chapters 98 and 105, it is provided that in the case of births the attending physician must notify the State Board of Health within twenty-four hours after birth if a child has any deformity or physical defect, and that the State Board of Health shall place the afflicted child in "such appropriate hospital as the board may determine for surgical or other treatment and care, when-

ever in the judgment of the board such child would be benefited thereby, and such treatment has not been or is not likely to be otherwise provided." It is also provided that the name of the deformed or defective child shall not be made known to any newspaper or magazine. It is certain that by this provision many a child will grow up with a good body who otherwise would be obliged to carry through life some deformity. This admirable law is one which deserves the widest adoption. This great step forward in public medicine should be followed by other steps and the movement is sure to be rapid.

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PART II

CONSERVATION AND ECONOMIC EVOLUTION

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CHAPTER I

CONSERVATION IN ITS RELATION TO INDUSTRIAL EVOLUTION

Economically speaking, society thrives or languishes according as production is abundant or scarce. Production, when carried to a scale beyond the subsistence needs of savagery, requires the industrial organization of natural resources, labor, and capital. These three great economic factors are not usually available in like amounts at all times and places. Upon the frontiers of settlement, natural resources are superabundant, labor is scarce, and there is little or no capital. In districts of dense population, material resources are frequently inadequate to afford profitable employment for labor, resulting in poverty and economic and social degeneracy. In like manner, the supply of industrial capital varies with time and conditions. Thus we see that changes in the density of population, in the magnitude and availability of natural resources, and in the supply of capital are immediately reflected in the character and efficiency of the industrial mechanism of a community or of a society.

Production is the basis of prosperity.

The changing factors of production.

That such changes do take place and that they tend to follow a natural or evolutionary order has long been recognized. Economists have designated successive periods in industrial evolution as "pastoral," "agricultural," "handicraft," "manufacturing," and "commercial" stages. The description of these industrial eras portrays scattered settlements amid an abundance of rich soils, mineral deposits, forests, fisheries,

Economic stages are marked by a changing ratio of natural resources to population.

etc., during the earlier stages of economic development. As time goes on, there takes place a gradually reversing *proportion* of population and natural resources until the multiplication of settlements and growth of cities render the intensive industrial processes of manufacturing and commerce and a more prudential use of natural resources matters of sheer necessity. This very logical readjustment in passing from the simple economic activities of a primitive existence to the complex organization of modern industry, as population increases, is frequently said to exemplify man's most progressive trait—*adaptability to environment.*

Changing economic conditions cause change in the relative importance of factors of production.

But, in this customary statement of evolutionary tendencies there is little if any analysis of the changes which take place in the *relative importance* of different agents of production. Nor do we find much thought given by economic writers to the interpretation of *man's conscious adaptation of his environment to his needs.* From a cursory study of industrial evolution it is apparent that society's economic use of the three great forces—natural resources, labor power and capital,—has varied enormously in amount under changed conditions, and this *quantitative variation* is increasingly apparent with the flight of time, the growth of population, and the development of science. Less apparent, but no less real or significant, are the *changes in the social values* of these three productive forces; that is to say, in their relative importance to society as means of producing wealth and securing a livelihood.

The significance of industrial power in the definition of conservation.

The purpose of conservation, in practice and as a public policy, is to increase the productive power of natural resources and to heighten social values. As we insist, it deals not with natural resources alone, but with the coördinated functioning

of natural resources, labor, and capital; and it is particularly concerned with their productive possibilities in the future as compared with their actual utilization in the past and the present. *Proceeding in accord with these principles, conservation may be characterized as a prudent administration of the natural agents of production, enforcing reasonable restraint and efficient utilization in the appropriation of the physical resources of the earth, and when feasible promoting their reclamation, to the end that productive capacity shall be economically developed and maintained and that the natural inheritance of the race shall be improved whenever possible and expedient and shall in no case be unreasonably impaired.*

Social and political expediency require recognition.

An effective conservation programme must be practical from the financial or economic point of view and, at the same time, it must be socially and politically expedient. It is necessary, therefore, to study the historical processes of industrial progress and to observe the changing relations of natural resources to production and to economic needs as they arise. We may thus glimpse the probable rôle of certain resources in the future scheme of social and industrial organization and thereupon so direct the management and use of natural resources as to serve the higher needs of both present and future. It is also necessary to understand the political and social beliefs and prejudices which so largely determine the attitude of individuals upon mooted questions of private rights, social welfare, and public authority.

Social philosophy and social value.

In forming conservation policies, we must recognize the contradictions which exist between the different prevailing philosophies that generate the forces of social control. Individualism, sectionalism, nationalism, and cosmopolitanism present different and mutually contradictory ideals of personal responsibility, economic

life, and governmental policy. In view of these diverging social philosophies, all that we can count upon as a certain and permanent basis for the general acceptance of any conservation policy, is the personal benefit to individuals that will follow its application. We can of course count on the individual recognizing the advantage of any immediate personal benefit to himself, but that persons or groups of persons, ranging in their habits of thought from individualism to cosmopolitanism, should be in harmony as to what constitutes *social values* and makes *for good public policy* in the handling of natural resources, is extremely doubtful. Indeed, a review of conservation literature must convince one that a generally acceptable definition of the term *social value* as related to the use of natural resources has not been even approximated.

The circumstances demanding consideration in a conservation programme fall within two categories:

First, the *physical order of industrial evolution*, i. e., the changing quantitative relations of natural resources to the supply of labor and of capital, and the changing social values of such resources in the service of economic needs as they develop.

Circumstances limiting the possibilities of conservation.

Second, the *psychological order of industrial evolution*, i. e., the philosophical doctrines that from time to time sanction prevailing economic institutions, and the progressive trends of thought that are now apparent and that may be anticipated of the future.

The first evolutionary process involves all the material conditions of human existence and environment. We observe the quick growth of population and contrast this with the amount and capacity of certain natural resources; we observe how the same

Physical and psychic facts contribute to industrial evolution.

human force is at one time capable of great production, while at another it may spend itself in futility; how the door of economic opportunity is opened and closed; how the variable and uncertain availability of natural resources, labor and capital cause continual readjustments in industrial organization; and how the quantity and quality of industrial production is forever changing.

The second evolutionary process involves the psychology of human relations, particularly of those growing up out of the possession, use and enjoyment of natural resources—pride, selfishness, altruism, justice, profligacy, thrift, miserliness, subordination to authority, etc., etc.

Study of economic conditions and machinery of social control a prerequisite of conservation programme.

The first point requires of us an analysis of the economic and social conditions which accompany a normal progress of industrial evolution. The last point would bring us to a consideration of the machinery of social control: the machinery that will be in harmony with dominant existing social institutions and that will bring natural resources into most effective and permanent correlation with labor and capital.

We are, therefore, forced to proceed with the understanding that any useful description of the possibilities of conservation cannot conform to any generally recognized meaning of the term as a doctrine or policy. We may, however, consider a variety of actual and probable circumstances and frame methods of procedure designed to accomplish certain *definite purposes* essential to national economic prosperity as effectively as may appear expedient.

The Four Stages of Industrialization

There is a normal order of change in the quantitative interrelations of natural resources, labor power, and capital

in the course of social progress. The necessary economic readjustments which appear from time to time in the industrial coördination of the agencies of production are so marked as to separate the industrial evolution of any nation or community into four possible stages or periods which may be indicated as follows:[1]

The order of industrial change from frontier to maturity.

1. A period of *exploitation.*
2. A period of *industrial development.*
3. A period of *industrial maturity.*
4. A period of *industrial regression.*

The period of *industrial exploitation* is generally entered upon by the private appropriation of natural resources from the public domain in a new country, and by the application of labor and capital in the initial industrial processes of wresting wealth from the land. The pecuniary demands of those directly interested and occupied in such industry, be they promoters, capitalists or settlers, are usually immediate, and the rewards of their enterprise must be had in quick profits. Their economic interests are, for the time, confined to present values.

The characteristics of the stage of exploitation.

By "exploitation," as here used, we mean the destructive utilization of natural resources typical of initial industrial activities; such resources being converted with a minimum

[1] Not all communities may necessarily experience all of these industrial periods. The *regressive period* may usually be avoided by the exercise of prudential economic policies. On the other hand, social and political conditions may be such as prematurely to arrest development and invite regression in lieu of industrial growth and maturity.

This chronological order is even more accurately applicable to the evolution of any particular industry primarily involved in the utilization of a particular resource.

expenditure of labor, capital, and time. The term also includes the destructive conversion of industrial capacity into present wealth and the using up of non-replaceable resources during later periods of industrial evolution.

Exploitation is a legitimate practice in initial industrial periods.

The industrial exploitation of new regions is often an easy process, owing to the conveniently accessible natural wealth of the earth that has never been collected. Indeed, the foreknowledge of such easy profits of exploitation is the usual incentive to frontier occupation. Natural resources are abundant and cheap, and, in the absence of official restraint, fur-bearing and food animals are taken, placer gold and other surface deposits of the minerals are exhausted, forests are leveled, natural pastures are denuded and soils are impaired. This, then, is exploitation—*the destructive appropriation of natural resources for the satisfaction of immediate human desires.* More or less exploitation is always a temporary necessity for the subsistence of the pioneers. Exploitation may also afford the only means of securing the additional capital and labor essential to substantial industrial development. However, exploitation more often signifies the universal craving for hasty accumulation of private fortune, and generally its methods are careless of the future needs of industrial prosperity and social welfare.

Exploitation and speculation.

Exploitation is sometimes preceded or accompanied by a considerable speculative outlay of capital. Such outlays may be quite necessary to make available the resources in question, and, because of the assumption of extraordinary risk, they may entitle investors to "speculator's profits" in cases of successful venture when actual risk is encountered.

The ultimate significance of exploitation as bad economic policy lies, not so much in the fact that the pioneer reaps

a harvest without sowing and turns to rich profit the abundant natural growth around him, but in the fact that by his ruthlessness he impairs the unused and latent natural agents of future usefulness and thus destroys social values.

Destruction of latent social values the chief fault of exploitation.

A *régime of development* follows close upon the hand-to-mouth scramble of the frontier. Having exploited the naturally matured values of the land, man ceases to reap where nature alone has sown, and, for the time, devotes himself to sowing and cultivation, in order that there may be future harvests. In order to realize industrial production and commercial values in the future, labor and capital are expended in the development of mines, in the improvement of refractory soils, in the construction of transportation facilities, and in the building of manufacturing and commercial establishments. In brief, *exploitative acquisition* is replaced by *production* and transient enterprise gives way to permanent industry.

The characteristics of the developmental stage of industry.

A tedious and hazardous period, in which much labor and capital are expended in development is necessary for the establishing of an efficient and permanent industrial mechanism. The fact is often overlooked that, no matter how rich natural resources available for a specific industrial enterprise may be, substantial development generally requires an excess of expenditures over earnings for a considerable period. Development becomes possible, therefore, by virtue of a present sacrifice of capital and labor, the remuneration for which must await the maturity and possible success of the venture. In exactly the same way, the industrial development of communities and nations requires the investment of capital

The deficit of industrial development.

and labor. The bonanza days of fur-trapping, placer-mining, hardwood-lumbering, and cattle-ranging are always succeeded by heavy investments and a slowing up of production during the development of lode-mining, scientific agriculture, animal husbandry, and permanent manufacturing and commercial establishments. It is obvious that such development requires a surplus of capital and labor beyond that necessary for present maintenance and subsistence.

The necessity of a surplus to enable development.

The earlier profits of exploitation are not infrequently the main source of capital which is later employed in industrial development. Likewise, the natural increase of the population and the flow of immigration which supply the necessary labor-power of *development* very generally find their economic origins or stimuli within the régime of exploitation.

The economic history of the United States and, in less degree, of Canada abundantly illustrates the phenomena of industrial development and rapid growth of population following a successful exploitation of natural resources [1] and dependent upon such exploitation.

Development made possible by exploitation.

Our pioneer existence in the United States not only was conditioned upon a using-up of resources which, to some, seems regrettable, but our present capital has been in large part accumulated from the proceeds of a favorable trade balance from the export of raw products of exploitative industry. This has continued for a hundred years and our

[1] The customary reliance upon the profits of exploitation, as a source of capital for development, is revealed in the absence of private initiative and the consequent necessity of governmental development where rewards of exploitation are not inviting—The Panama Canal; the United States Reclamation Service; the construction of railways in northwestern Canada and Alaska, afford illustrations.

foreign credit, until recently an essential source of developmental capital, has been based upon the expectation of a continuing export of products in the origin of which exploitation plays an important rôle.

The importance of organization and permanence.

The aim of industrial development is to bring natural resources under a permanent business organization which is in accord with sound economic policy. Such organization involves a far-sighted coördination of the several factors of production which promotes not only social thrift in the use of natural agents, but promises permanent and profitable employment for a growing population and opportunity for future accumulation of capital. The prosperity of the nation in the coming days of industrial maturity and "social saturation" will depend upon an efficient combination of natural resources, labor, and capital in its productive organism.

Summary.

The chief characteristics of the developmental period of industrial evolution are three in number, namely—

1. The increasing proportion in which labor and capital are combined with natural resources in industrial processes.

2. The establishment of permanent instead of temporary economic and social institutions.

3. The conscious effort to put production upon a permanent basis of maximum annual output.

The characteristics of the stage of industrial maturity.

The *period of industrial maturity* is entered upon when a community becomes permanently self-supporting; that is to say, when, in so far as may be foreseen, the productive capacity of the industrial combination of natural resources, labor, and capital will continue adequate to meet the needs of the population without substantial impairment either of resources, capital, population,

or the scale of living. *Industrial maturity* does not necessarily imply maximum economic efficiency, or intensive industrial organization, or even a stable population. The trend of evolution within the stage of maturity is, however, in the direction of such conditions. The concept of industrial maturity embraces a variety of conditions of personal, community, national, and cosmopolitan economic self-sufficiency. In the growth of most industries, or industrial communities, or industrial nations, *development* normally emerges into *industrial maturity* and economic independence, which, at first, may involve an extensive utilization of natural resources and gradually advances to intensive utilization. The maximum degree of natural industrial intensivity, and the consequent ratio of population to means of subsistence, will, however, finally be determined by sociological factors acting in conjunction with economic conditions in setting scales of living, standards of social saturation, policies of immigration, and conventions of human reproduction.

Industrial maturity implies permanent self-sufficiency.

The idea of permanence, as applied to social and economic policies, is not absolute. Theoretically, of course, "the State is immortal," but an industrial régime can imply no greater futurity than is contemplated by the impelling interests of the present. Such interests, when individualistic and private, are probably satisfied with a shorter look into the future than is commonly supposed; when public, they are continuous, and the *present* and *future* approach equality in importance.

The *period of industrial regression* is evidenced by a declining ratio of industrial production and social income to economic effort. Despite a dominating popular desire to attain and maintain the highest

The characteristics of industrial regression.

level of productive efficiency, the task becomes increasingly difficult. With the growth of population, the natural limits of industrial opportunity may cause the average per capita production to decline. Unforeseen defects in economic policy, in the industrial structure, or in social adjustments seem, finally and invariably, to invite economic degeneracy. Regression is constantly appearing in industry after industry, and in community after community. Industrial reorganization and recovery often follow. In other instances the decline in particular industries or localities is permanent, but is offset by development and progress elsewhere, so that general industrial regression and national decay are not evident. However, the lessons of history cannot be gainsaid. Nations, having failed to maintain their equilibrium upon the peak of industrial capacity and social well-being, have declined. Regression has frequently followed close upon the attainment of an advanced industrial maturity; closer, in fact, than has generally been realized, because a semblance of prosperity has usually been sustained for a time in the effort to disguise reduced economic capacity and declining national strength.

Some causes of regression.

Customary practices of exploitation and industrial development, doubtless, tend to weaken the foundations of economic growth and permanency. Over-exploitation of certain natural resources, particularly soils and forests, has undoubtedly dwarfed the industrial powers of many communities and of some nations. In the United States, there have been relatively few instances of excessive exploitation. On the other hand, development of resources has often been speculative and over-hasty, resulting in industrial depression and temporary regression. In a somewhat spectacular

way, oil and gas deposits have been mishandled and coal and other mineral reserves have been weakened. Noticeable regression may not in every instance actually be traced to such practices, but it is none the less certain that by them the nation is delayed in attaining industrial maturity and is cheated of attaining its full economic stature. Over-exploitation of certain natural resources has undoubtedly dwarfed the industrial powers of many communities and some nations. The hasty development of certain forms of production in the United States accounts for some clearly discernible symptoms of regression. The importing of foreign labor to hasten development has become a disconcerting menace which positively threatens to prevent the attainment of a wholesome economic equilibrium and may react to induce regression through overpopulation and the introduction of low standards, and finally to promote inefficiency.

Industrial stages overlap.

It is to be observed that the successive stages of *exploitation*, *development*, *maturity*, and *regression* are not always clearly separable in the industrial life of a community or a nation. Nor does the industrialization of all natural resources invariably pass through all of these stages. Indeed, resources are frequently so difficult of access or so useless in their natural state as to require expensive development from the beginning and thus afford no chance for exploitative gains. The nature of the resources of a district may be such as to justify coincident exploitation of some and development of others—possibly, as is suggested above, the cost of developing the one is borne by the gain of exploiting the other. Furthermore, what is generally designated as over-hasty, undercapitalized, and prodigal development may be justifiable

and reasonable, the alleged haste, waste and inadequacy of capital being, in fact, the most expedient and best possible application of available industrial resources to the relief of immediate social needs.

Future conditions are uncertain and economic policy speculative.

The uncertainty of the growth of population during early industrial periods and of future scales of social consumption, particularly in the absence of a definite immigration policy, makes an accurate forecast of the results of any industrial programme difficult. Certainly, the prohibition of exploitation and the requirement of conservative development of natural resources are not always to be recommended. The probabilities of undiscovered deposits of natural resources, of unforeseen needs for those now available, of new methods of utilizing resources now superabundant, and of discovering or inventing substitutes for resources now being exhausted sometimes make very difficult an intelligent choice between exhaustive exploitation and careful development.

Rational Social Policy and the Changing Order

A surfeit of population results in exploitation of human resources.

We have seen that the quantitative relations of natural resources to labor are reversed in the normal course of industrial evolution; that is to say, superabundant natural resources and scant population in the beginning are in marked contrast with the dense population and the over-manned natural resources at the other extreme of the evolutionary scale. The contrast between the keen need for capital during the period of development and its subsequent ampleness and availability is likewise significant. At the beginning, we have the exploitation of an apparent surfeit of *natural* resources. It is logically certain that during a later stage we may have

the exploitation of an apparent surfeit of *human* resources—as has often been seen when a ruthless economic disregard for the human agencies of production and a repletion of social capital takes place in overpopulated countries. The economic history of many of the older nations, including Egypt, Italy and Spain, supplies examples of what may well be termed *exploitation of human and capital resources*.

The compensatory nature of factors of production.

To say that industry requires the coöperative action of all the factors of production—a certain amount of each being an economic necessity—is a common-place; but the very important fact that, within limits, land, labor, and capital in industry are *mutually compensatory*, that one may, to a certain extent, take the place of another and perform its functions, has received little or no comment in the discussion of conservation. This fact should be recognized in the formulation of any industrial or financial policy, particularly, in considering the relative importance of the land, labor, and capital which enter in. In appraising the values of *creative agents*, the law of demand and supply is just as applicable as in valuing the *products* of industry. To the extent that ordinary commodities can be substituted for each other, a decrease in the supply of the one may be compensated by an increase in the supply of another without seriously disturbing economic conditions. If the supply of one becomes plentiful and cheap while the other remains scarce or becomes dear, the substitution will be automatic and economical. If, however, the compensating qualities are not perfect, substitution, which at first is easy and profitable, will involve an increasing amount of misfit and gradually we approach a maximum proportion of the cheap and plentiful article and a minimum proportion of the scarce article. The fact that

the one article is scarce and, despite partial substitutes, must be had in certain minimum amounts makes it high in price and greatly to be prized and preserved. Now, natural resources, labor, and capital bear this compensatory relation to each other. A small area of land and a large number of workmen may produce a harvest equal to that of a larger area and fewer workmen. Intensive cultivation, in the first instance, duplicates the results of extensive culture in the second. In like manner, in either instance, the number of workmen might be reduced and machine tools be substituted so that the industrial result would remain unchanged. What the organization actually will be at any time depends upon the available amounts of land, labor, and capital. The fact that they are mutually compensatory makes possible the existence of equally productive combinations under varying conditions of supply *within the range of satisfactory substitution.*

Changing conditions require reorganization.

A characteristic phenomenon of economic history is the contrast of declining reserves and steadily advancing values of natural resources, and the increasing population and wealth and declining relative values of labor and capital. The stages of industrial evolution are marked by a prodigality of natural resources during earlier times in compensation for lack of capital and labor, and in later periods by the existence of labor and capital in such abundance as to compensate, in part at least, for limited and reduced natural agents of production. Thus we see that "waste," as applied to the agents of production, is a relative term and the consideration of time and condition is all-important in justifying its use. What is a rational adjustment of human and natural resources to each other at one period must appear inexpedient and

The reversing industrial values of human resources and natural resources.

"Waste" is a relative term.

wasteful when judged by the standards of another generation. Just as the need for capital requires some exploitation of natural resources at an early stage; with equal logic, the maintenance of economic opportunity and national integrity may at a later stage of dense populations demand a temporary expenditure of life and treasure through emigration, or in defensive warfare, or in territorial conquest, which, considered in the abstract, are "wasteful."

Summing up our analysis of the relation of natural resources to the other factors of production, these facts emerge: (1) the evolution of industry usually implies a gradually reversing quantitative proportion and valuation of natural resources to labor and capital; (2) the over-zealous fostering of any one factor of production involves a compensatory sacrifice or misuse of another; (3) mere quantitative measures of superficially apparent industrial prodigality, either of natural resources, capital or humanity, are not always criteria of economic waste.

Summary.

A policy which unnecessarily delays the natural expansion of population and industrial development, by restricting the conversion of natural resources into capital during a frontier régime, is false economy, not conservation. A restriction of the economic opportunity essential to a normal growth of population, by withholding resources from development and otherwise obstructing industrial output during a period of growing population, is monopoly, not conservation. Socially considered, policies and practices which hold natural resources in idleness and restrict employment and production constitute the essence of economic waste and promote industrial inefficiency.

Conservation must be in accord with economic opportunity.

The social ideal of industrial maturity is a continuing

economic progress until a comfortable and wholesome scale of community or national living is attained; and thereafter, the maintenance, at least, of this standard of industrial capacity and social well-being. This ideal does not imply a stable population, a fixed standard of living, or even the non-impairment of natural resources. It does mean, however, a rational adjustment of present and future resources and needs. Thought must seriously be given to the future—natural resources should be protected when it seems clear that the needs of the future are socially more important than the demands of the present. The possible needs of the future should also be controlled to a certain extent. When population threatens to become superabundant, immigration should be restricted and made selective; and there are wise measures which may be made effective in controlling the quantity and quality of the natural social increase. The distribution of population should also be considered. Settlement and industries should be so located as to secure the fullest possible benefits from the natural resources of the country, as well as the benefits of mechanical development and scientific discoveries. In this connection it should be realized that climate, topography, and geographical location with respect to markets and transportation facilities are natural attributes of great value which are too frequently neglected. The extent to which an unscientific railway rate structure has fostered artificial development in the United States and obstructed a natural and economic distribution of industry and population is striking. The resulting malformation of industrial growth is one of the most outstanding evidences of present-day economic waste. The reformation of railway rate structures affords a most fertile field for conservation activities.

Social Value and Productive Power

We have said that the principle of efficient coördination is a commonplace. Nevertheless the bearing upon conservation of the coördination of natural resources, labor and capital has scarcely been realized.

The observation and the theoretical analysis of a changing social significance of acres of land, hours of labor, and dollars of capital are not new to political economy. The Malthusian teaching that, as time goes on, the ratio of land to population grows less favorable, when considered from the social point of view, has long been an accepted major premise in the formulation of labor-, land-, and immigration-policies. Ricardo's analysis of the natural distribution of labor and capital among lands of varying fertility and his observation that, as population expands, poorer and poorer lands come into cultivation revealed the fundamental forces which fix land rents and determine the values of natural resources. A combination of the Malthusian doctrine of population and the Ricardian theory of rent constitutes the foundation of modern theories of economic welfare and wealth distribution, and in considerable measure, of public land and financial policies, in so far as they are in accord with scientific demands. These theories, moreover, furnish a logical *defense* of the private right to own property and to receive an income therefrom, quite as well as a basis for the regulation of property and income in accordance with changing economic conditions and social needs.

Teachings of Malthus and Ricardo are fundamental in economic theory.

The relation of all this to conservation was first clearly recognized in Germany and has been taught and practiced there for more than half a century. But the idea is not new on this side of the Atlantic.

The teachings of Raymond and List.

Daniel Raymond, an American, writing nearly a century ago, expressed it when he developed the thesis that capacity, not riches, constitutes national wealth.[1] Raymond insisted upon the character of the nation as an economic unit. The interests of individuals or classes, he maintained, are not to be mistaken for the needs of the nation, for they may be opposed to the larger and continuing needs of the nation as one and indivisible. From these principles, Raymond concluded that economic science may not properly be confined to the creation of values and the acquisition of riches, but includes, as its primary object, the development of capacity and of administrative and legislative means of securing the greatest well-being of all citizens—present and future alike. Friedrich List, a German, writing under the stimulus of observations in America, a few years later than Raymond, characterized the ideal of industrial enterprise likewise, "The causes of wealth," he said, "are something totally different from wealth itself. The power of producing wealth is infinitely more important than wealth itself. The nation derives its productive power from the mental and physical powers of the individuals, from their social, municipal and political conditions and institutions, from the natural resources placed at its disposal or from the instruments it possesses." [2]

Industrial capacity, not wealth, is the basis of economic well-being.

Some Hypotheses of Conservation

A summary of the foregoing pages together with certain deductions which are beyond dispute may here be set down

[1] Raymond, Daniel: *Thoughts on Political Economy*, 4th ed. pp. 81, 84, 116, et seq.

[2] List, Friedrich: *The National System of Political Economy*, pp. 108, 109. Translation by S. S. Lloyd, 1904. Original appeared in 1841.

as fundamental principles and conditions which must be understood in the discussion of conservation problems.

Natural resources are but one of three essential economic supports of industrial society. Excepting extreme conditions of extensive or intensive industrial organization, land, labor, and capital are mutually interchangeable and compensatory in productive processes. The economic importance, or value, of a unit of either in terms of another is, at any time, inversely proportional to the relative supplies of the two.

Natural resources but one of three factors of production.

Labor and capital, employed in private industry in conjunction with natural resources, require compensation in wages and interest to the extent, at least, of subsistence and maintenance; otherwise, labor or capital is being exploited in behalf of natural resources.

Necessary payment of wages and interest.

Capital, socially considered, is a combination of transformed natural elements and "saved labor." It is possible that capital may incorporate greater and more enduring social values than would the uncombined natural resources and labor consumed in its creation.

Capital is converted natural resources and labor.

There is a clear distinction between the methods and motives of private economics on the one hand, and the purposes and responsibilities incident to the practice of social economies on the other.

Private economics versus public economies.

The costs or sacrifices involved in any conservation programme are mainly present, direct, and personal; the benefits which may accrue from such present sacrifice of labor, capital, or opportunity are mainly social, and are indefinite as to futurity, amount, and distribution.

Conservation costs are private and present: conservation benefits are social and future.

That paradox of political economy which makes industrial capacity and abundant production the criteria of social well-

being, and makes scarcity and restricted industrial output conditions of high values and private wealth, reveals the crux of the problem of formulating national economic policies which will avoid conflict with private practices of wealth-getting and wealth-using.

A paradox of political economy.

Conservation may involve the arbitration of conflicting principles of national or social economics and private economics. This is especially manifest under the historically individualistic Anglo-Saxon institutions of private property and freedom of contract.[1]

Public authority and the use of property.

The final arbiter between private rights and social welfare is official authority asserted in behalf of the sovereignty of the State and perpetuity of society and made effective through the arm of the police power in supervising and, possibly, restraining the arbitrary exercise of individual freedom and in restricting the unsocial use of property.

[1] The implication is not that private and social interests are at all times in conflict. As will appear later, it is only within certain spheres of industry that a definite conflict exists. Furthermore, the conflict is more likely to concern matters of initiative and management than of pecuniary benefits.

CHAPTER II

THE POSSIBILITIES OF CONSERVATION WITHIN THE DIFFERENT STAGES OF INDUSTRIAL EVOLUTION

Before proceeding to a study of the practicability of conservation, it is necessary to undertake a descriptive classification of natural resources which will serve for purposes of economic analysis. Considered from the point of view of relative present and future scarcity and value, natural resources fall within the four fairly distinct groups indicated below.

I. Resources which are so abundant as to have negligible present values, but bear promise of future scarcity and value.[1]

II. Resources which have present value and are subject to increasing scarcity or demand:—

a. Not exhaustible by use.

b. Exhaustible in use but subject to maintenance and restoration.

c. Exhaustible in use and not restorable.

The classification of natural resources.

III. Resources which have present value, but are subject to deterioration or loss of value through non-use.

IV. Resources which have no present value, but which are subject to "reclamation" and development to a condition of usefulness and value.

We may now consider how a conservation programme should be formed to fit the changing conditions of industrial evolution.

At times of economic and social beginnings, individual needs and private initiative are seldom in serious conflict

[1] *Value* is here used in a commercial sense and should be distinguished from *social value*. Social value would include both present and future usefulness.

with social progress, nor are present interests necessarily destructive of future welfare. On the frontier, economic life is usually a personal struggle for existence. When the main economic problem is the present survival of the individual and the family, society and the future are obliged to stake their chances upon the perseverance of private initiative and industry. Throughout the first industrial stage, therefore, growth of population, increasing labor power, and the accumulation of capital are all-important. To these prime objects, natural resources are properly subordinated and dedicated.

Conservation during the period of exploitation.

When Adam Smith wrote his *Wealth of Nations* which, until recently, has been the Bible of English and American political economy, and still later when John Stuart Mill and others occupied the high places in economic and political thought, much emphasis was being placed upon the philosophy of individualism. The rôle of labor and capital was relatively over-drawn and the industrial functions of natural resources were neglected.

The economic teachings of Adam Smith and John Stuart Mill.

The convincing books which they wrote and the public policies which were based upon their teachings were well fitted to conditions as the pioneers found them in the United States; namely, the boundless opportunities of an unmeasured and unsettled natural domain rich in resources unappropriated and undeveloped. It is not strange, therefore, that our economic, social, and political institutions are, in the main, fitted to the early stage of natural abundance and exploitative industry; nor is it strange that present-day thought, business customs, and legal rights still bear the deep impress of an economic era which, for the United States, has passed.

American economic policies are fitted to frontier conditions.

During such times of normal exploitation, a conservation

programme logically can go little farther than (1) *to restrain the reckless destruction of resources having no considerable present worth, but which are subject to future scarcity and value, and* (2) *to restrict speculation by which the possibilities of such future social values may be reduced to present private gain.* Two regulatory measures will accomplish these ends: (a) *Education of the public mind upon the economic needs of the future and upon the probable social values of resources now subject to neglect and destruction because of their negligible present value;* (b) *The establishment of the principles of "beneficial use" and "resource taxation" as sanctions of private property in natural resources.*[1]

The restraint of destruction of and speculation in future values.

The aim of *development*, except when very scarce and non-restorable resources are involved, is to create a permanently efficient industrial organization of natural resources, labor, and capital. *Permanent* is, however, a relative term, especially when it is used in reference both to private and to social institutions. What we may call the life-interest of the individual is, of course, short in comparison with the interests of society or the anticipated life of the State. Therefore, the social interest may require a slower and more thorough industrial development than will be effected by private initiative. Here, again, a logical conservation policy may so direct the utilization of natural resources, particularly those which bid fair to become the basis of the production of social necessities, as to make for industrial perpetuity rather than mere productive efficiency. "Haste makes waste" is an ancient proverb which is particularly applicable to the development of industry. When socially im-

Conservation during the period of industrial development.

Industrial perpetuity versus transient productivity.

[1] For a statement of these principles see Chap. V. pp. 162–184.

portant natural resources are involved, public policy should direct developmental methods to the gradual attainment of *the highest industrial capacity.* No other economic principle is consistent with national security and social permanence.

The principles of conservation which are essential and adequate to wise development are complex and their application will require a measure of public supervision of business which is in discord with the traditional *laissez-faire* privileges of private property and freedom of contract. In brief, they should include:

a. The gradual adaptation of natural resources to their highest use—"use" being interpreted in terms of social benefits rather than private gain.
b. Restoration of partially exhausted resources when possible and socially expedient.
c. Prudential utilization of exhaustible and non-restorable resources, and the substitution therefor of less-exhaustible resources whenever possible.
d. The reclamation and development of impotent resources by irrigation, drainage, etc., whenever socially expedient.

The exercise of public authority is necessary to secure socially expedient development in extractive industries.

To put such policies into effect requires a considerable application of public authority and an extension of administrative functions beyond the sphere of *laissez-faire* government. *An official classification of natural resources, a mandatory supervision of uses of privately owned resources, the maintenance or establishing of public property in the more exhaustible and highly essential resources, and the enlistment of official initiative and public finance in reclamation, compose the essentials of a conservation programme fitted to the stage of industrial development.* All of these practices are now effective and legally sanctioned within a limited range. Their rapid extension is a matter of social necessity, but such extension

can only be made through a reduction of the absolutism of private property and a limitation of the customary right of private contract; and with the aid of an increase in the public budget and an improved official personnel, both state and federal.

The *period of industrial maturity* has already been reached in many industries and probably by the majority of nations. Under such conditions, *the ideal of economic progress is the maintenance of productive stability by the prevention of industrial deterioration and the wholesome restriction of social demands.*

Conservation during the period of industrial maturity.

In this period of maturity the same programme of conservation should be followed as during the period of development, but the methods of maintenance, restoration, and substitution that we have described should be extended and intensified wherever possible.

Maintenance, restoration and substitution the final measures of physical conservation.

At this point, a comprehensive system of national economy will depart from the consideration of the quantitative aspects of natural resources as a primary problem, and may profitably inquire into the possibilities of conservation as applied to the accumulation and use of capital and to the efficient utilization of the productive power of the population. It will deal with the sumptuous demands of certain classes of society and will aim to preserve the full productive efficiency of these classes; and it will endeavor to make the fullest use of available capital so as to compensate for the declining availability of natural resources.

Conservation of capital and man-power requires attention.

The *regressive period* of industry, as above described, implies conditions of virtual industrial insolvency. Such conditions may result from either of the following causes:—

Conservation under conditions of industrial regression.

1. Exhaustion of non-replaceable resources, such as metalliferous deposits, natural gas, and petroleum.
2. Exploitative impairment and neglect of resources which are properly subject to sustained industrial services; for example, soils, forests, and fisheries.
3. Mismanagement in development, usually due to short-sighted private policy in such matters as water-power promotion and land development.
4. Over-population, resulting in failure of productive capacity to keep pace with economic needs of society.
5. Over-consumption, due to an inequitable distribution of wealth and income, resulting in impoverishment of society through a sapping of economic vitality and reduction of productive capacity by the indolence and luxury of the rich and the non-productivity of the coterie which surround them.

A conservation programme fitted to the needs of industrial and social regression may very properly follow the business practices obtaining in *wise receivership;* namely, "close out the enterprise" or "reduce fixed charges and reorganize under an efficient management." Indeed, conservation, in its etymological meaning, does not quite apply to those processes of economic rehabilitation which are necessary to block the wheels of industrial regression—perhaps *reclamation* and *reconstruction* are better terms.

Reclamation of impaired resources.

In some industries or communities, the appearance of regressive conditions leaves no choice but the abandonment of worked-out or permanently impaired natural resources in order that labor and capital may be economized. The resulting geographical or occupational migration of population introduces no serious economic problem if undeveloped resources are elsewhere available or if new industrial opportunities may be conveniently substituted. The exhaustion of New England soils, Rocky Mountain placers, and Illinois forests were only symptoms of

Impairment of resources may necessitate abandonment

temporary industrial regression and were quickly corrected by readjustments of the population and changes of occupation.

Regression resulting from mismanaged development of natural resources may usually be remedied by the application of reclamation measures. Reclamation requires a considerable expenditure of labor and capital without immediate compensation in order to revive the productive capacity of natural resources. It is possible that a mandatory official supervision of industry may stimulate the undertaking of reclamation measures by private agencies. Much may be done toward preventing industrial regression by the requirement of depreciation and replacement funds which shall be used to prevent the running down of resources which are restorable. However, experience has fairly well demonstrated that the public purse must bear the main burden of industrial reorganization and rehabilitation. In practice, private initiative remains impotent in this field for the same reason that applies to expensive and long-time developmental projects, viz., the over-ruling pressure of present needs.

The expense of reclamation usually falls upon government.

The Departments of Soils and of Forests, under the German government, supply an excellent working example of governmental reclamation of impaired natural resources. Other governments are rapidly following the example of Germany.

Over-population and over-consumption constantly menace the economic prosperity which should accompany industrial maturity. Prosperity in itself is a stimulus to the growth of population, and the physical limits which nature has placed upon industrial opportunity undoubtedly validate the principal theme of the much abused Malthusian doctrine that *population tends to over-run the means of subsistence.* We are not yet seriously facing this problem in the United

Over-population necessitates migration, internal expansion, or aggrandizement.

States. Nevertheless, the experiences of other nations are prophetic of our possible future.

Colonization and migration were the favored correctives for the malady of over-population in times past. Their present and future inefficacy is becoming obvious. "Internal development" and commercial expansion have been attempted by Germany, with what ultimate success is not certain. Japan, with a population over one-third that of the United States confined to an area equivalent to that of Montana, appears to be forced by the pressure of population to a policy of national aggrandizement. All other considerations aside, the economic and political effects of over-population justify serious inquiry and reflection upon the sources, elements, and conditions of the growth of population as a conservation measure.

Over-consumption in the United States is perhaps the most immediate obstacle to the advance, indeed to the maintenance, of conditions of social and national well-being. A distribution of the pecuniary benefits of industry which places perhaps one-half of the total wealth and income in the hands of the more fortunate ten per cent of the population, and only one-tenth of the wealth and income in the possession of the less fortunate fifty per cent of the population is not conducive to national thrift. We shall not attempt to elaborate this point which has of late made itself so clear to all thoughtful people. Three general statements will here suffice to align certain significant conditions of wealth accumulation and extravagant living with the principles of conservation and social welfare.

Maldistribution of wealth is an obstacle to conservation.

1. When large amounts of wealth are, arbitrarily or by unwise management, withdrawn from reasonably productive industry, the capital of the nation is being impaired.

2. When the possession of private fortune induces indolence and extravagance in such measure as to reduce the effective productive capacity of the population, or to divert industrial agents from the production of social necessities and comforts to the production of luxuries, both the natural and the human resources of the nation are being unreasonably exploited and wasted.
3. The false ideals of success and the wasteful conventional scales of living induced by suggestion and imitation are far more injurious to the social welfare than is the prodigality of indolence and wealth, considered by itself.

A brief summary may here be drawn of the discussion of foundational economic policies as developed up to this point. Summary.

Tentatively at least, a comprehensive conservation programme must regard:—

1. The state of economic relations, particularly, with reference to the quantitative relations of natural resources to other factors of production and to the density of the population.
2. The evolutionary nature of society and the resulting chronological changes in all elements which enter into or are affected by conservation policies.
3. The established economic, legal, and political institutions which describe and limit the use and control of natural resources.
4. The technical structure and operation of governmental machinery necessary to administer the proposed conservation measures.

Succeeding chapters will deal further with the last two of these general precepts of national preservation, and will indicate the extent to which conservation may be practicable within the respective industrial spheres of private initiative and of public control.

CHAPTER III

CONSERVATION AND THE THEORY OF INVESTMENT

Commercial values, pecuniary conditions, and flight of time are primary personal considerations.

A private proprietor of natural resources is usually faced with several alternatives in the management, use, or disposition of his properties. In making his decision, he will contemplate, among other things, three primary economic considerations which enter into the situation. They are—

First—His present pecuniary situation and his prospective financial needs, both in connection with and apart from the properties in question.

Second—The present market values and the commercial prospects of his properties at successive future periods.

Third—The length of time which, under given conditions, he can advantageously devote to the maturing of any project which he may undertake with respect to the development, use, or disposition of his properties.

In brief, private policy in the management of property contemplates, primarily, personal financial conditions of proprietors, commercial values (actual and prospective), and the possible exigencies of the flight of time. The imperative pressure of present desires and the rather definite limits which the span of life places upon the futurity of personal interests are strong forces controlling private economic activities, and they must be carefully considered in framing conservation policies.

Conservation is characterized on a former page as a managerial policy designed to promote industrial capacity.

Now, the promotion of industrial capacity requires thrift, abstinence, saving, and the development of productive resources. It is not identical with the creation of commercial values or with the ability to gratify immediate personal wants; and, for this reason, conservation usually implies measures of restraint upon the personal accumulation of wealth and upon the gratification of extravagant desires. It is assumed, of course, that the personal thrift and sacrifice involved in any conservation project promise a net quantitative gain in future social goods; and in the national wealth and income, as measured by the net total of present and future goods. Granting this assumption, the three economic considerations mentioned above seem logically to place the wishes of individuals, in regard to the use of their property and in the enjoyment of possible present income, at variance with that regard for society and for the future which is demanded by conservation. In the private view, the postponement of personal gratification may be inconvenient or quite impossible. To-day's needs of necessity are not satisfied with anticipations of to-morrow's comforts, nor are the whims of the present sated with promises for the future. Moreover, the future productivity and social values which are the aim of conservation may not always redound, at the time of their consummation, to the pecuniary advantage of the private proprietor of the initial resources of production; nor may they generally be realized within periods sufficiently short to serve the personal needs of present owners. Indeed, since market values are frequently the symptoms of scarcity, the deliberate neglect or depletion of certain resources may contribute both to the present and to the future financial advantage of proprietors.

Industrial capacity is not identical with commercial value.

Scarcity may be a cause of private gain.

Why should a coal owner excavate cleanly at increased costs, thus reducing his present profits in husbanding the supply against the needs of future consumers, when even the prospect of scarcity tends to enhance prices and multiply profits? Why, indeed, should the cotton planter and the wheat grower conserve their soils when they observe the very practical truth that high prices and large net returns are as often realized from scant crops as from superabundant crops in years of plenty? It is not at all clear that maximum proprietors' returns are compatible with that quantitative industrial capacity upon which general economic well-being and national wealth depend.

The Analogy of Conservation to Investment

Gratification vs. saving.

From the point of view of the private owner of natural resources, conservation usually involves, not only the postponement of possible present income and the pleasures of immediate gratification, but a considerable cash outlay for taxes and for the up-keep of properties. If the immediate needs of proprietors are not pressing, and if a sufficient monetary return from the increase in value (*conservation increment*) is assured, the saving and waiting policy may be good business sagacity. But if the financial needs of the proprietor are pressing, and if the prospects of an increase in value within a reasonable time are not inviting, conservation clearly appears to be in conflict with that well known principle of private economics which establishes the *technical superiority of present goods over future goods*,—the proverbial preference for "a bird in the hand to two in the bush." When conservation burdens the owner of natural resources with the inconvenience, expense, and loss of income resulting from deferred use and restricted marketing, and with the risks of

an untimely cessation of one's economic endeavors, it ignores that personal preference for present values to which economists trace the necessity for the payment of interest on savings. This underlying principle of interest is a psychological fact which John Ray called "effective desire for accumulation," [1] which Böhm Bawerk designates as "perspective undervaluation of the future," [2] and which Irving Fisher characterizes as "time preference." [3] Now, it is this personal preference for things present that places the effective limit upon private savings for investment, and the degree of abstinence and thrift which is necessary to an adequate accumulation of capital can be induced and maintained only by the prospect of personal premium or reward. In other words, saving for the future is induced by the payment of interest on saved and invested wealth; and when the elements of risk and futurity are considerable the interest rate necessary to command capital is correspondingly high.

The percentage excess of present desirability.

As a business consideration, natural resources in private ownership represent actual or potential agencies of income, and the treatment of such resources and of the income therefrom, involves recognition of the business principles of investment and interest. At first sight it may appear, therefore, that the operation of conservation within the sphere of private proprietorship is controlled solely by the prevailing motives of private saving and investing; and, likewise, it might appear that outlays for conservation are always subject to the limitations imposed by the abstinence-premium or interest rate upon

Conservation and the interest rate.

[1] Ray, John, *Sociological Theory of Capital*, p. 54.

[2] Böhm Bawerk: *Positive Theory of Capital*, Smart's Translation, Bk. V, Ch. III.

[3] Fisher, Irving, *The Rate of Interest*, p. 88.

capital. By this theory, if the increase in the value of private property or of income consequent to conservation practices is equal to, or greater than, maintenance costs plus compound interest on the initial valuation at the prevailing rate, conservation would merely amount to a normal investment undertaking. Within a certain restricted field, particularly under conditions of corporation proprietorship and management, this is undoubtedly the case; but several very concrete personal qualities and conditions interfere with the general application and operation of the investment principle in promoting conservation, even when the resulting increase in values is sufficient to cover the above calculations of interest and maintenance. These obstacles are—(1) imperative present personal needs, (2) lack of foresight, (3) limited expectation of life, and (4) perfunctory interest of individuals in social and national welfare.

Let us examine more carefully the suggested analogy between capital accumulation and investment and the fundamental essentials of conservation finance.

The three stages of capitalization.

There are three significant stages in the creation of effective industrial capital; namely, (1) the production of a surplus of commercial values over and above the necessities of subsistence and maintenance, (2) the exercise of personal abstinence requisite to the saving and accumulation of that surplus, and (3) the conversion of the wealth thus accumulated into active capital—the process of *investment.*

Likewise, there are three essential stages in the carrying out of any conservation programme—(1) the occupation or acquisition of natural resources somewhat in excess of immediate subsistence needs, (2) abstinence from the practice of needless exploitation of surplus resources, and (3) the incurring of such expenses of develop-

The three pecuniary steps in conservation.

ment and organization of conserved resources as will ultimately place industrial capacity upon a higher and more permanent plane of productivity than would otherwise be.

The analogy between conservation and the accumulation of capital may be carried further. There are many individuals who will and do accumulate capital at considerable sacrifice to themselves for the mere love of possession, others accumulate for altruistic reasons (including, perhaps, the promotion of social welfare), many save for the social and political prestige that usually accompanies wealth, and some for no other apparent reason than that their incomes overrun their capacity or inclination to spend and consume. But the accumulations of all these individuals probably constitute a minor share of the private savings which are annually incorporated in the nation's stock of capital. The primary economic motive of capital accumulation is the cash-reward for abstinence—the realization of the principal sum, at some future time within the expected span of the life-tenure of the investor, plus a percentage premium upon deferred use and suspended enjoyment. The manner of the capitalistic return may take many forms varying from a simple annuity to the receipt of a lump sum, including principal and compound interest, at the end of the investment term. As a financial principle, the fact that interest must be paid to induce adequate saving and reasonable investment is fundamental.

Reasons for saving and investment—the interest rate is dominant.

Circumstances similar to those indicated above are associated with the conservation and prudential utilization of natural resources—the saving and investing of *natural wealth.* Miserliness, altruism, pride, prestige, affluence—all doubtless effectively stimulate an inclination to acquire and husband property

A conservation increment may be analogous to the interest rate.

in natural resources, and thus to promote conservation. But the essential and ultimate control of the normal personal impulse to exploit natural resources for present gratification is the *prospect of future gain.* There must, therefore, be a pecuniary *conservation increment,* analogous in amount, time, and manner of realization to the interest rate on capital, if conservation projects are to be substantially and effectively undertaken and carried out by the personal initiative of private owners of natural resources.

Further aspects of the similarity and even the identity of capital and natural resources will suggest themselves to the reader, and will strengthen the principle here advanced that the *theory of interest and investment* affords a possible basis of procedure in approaching the question of conservation upon private estates. The final, and perhaps the convincing point, however, is that in the developmental period, and, to a considerable measure, even in the exploitative period of industry, actual capital is invested in large amounts in the development and improvement of natural resources. Such capital is usually so intermingled with or "sunk" into the resources in question that the two become substantially amalgamated. This process of capital investment and its amalgamation with natural agents of production is particularly conspicuous where reclamation measures are necessary to bring natural resources into initial productivity. In such cases, it is quite impossible to discriminate between the industrial functions, productivity, and values of capital and of natural resources, and the processes of investment and of conservation become indistinguishable.

The amalgamation of capital and natural wealth in industrial development.

There are two points of marked difference in the respective characteristics of natural resources and of property

composed of artificial wealth or *capital*. There are very distinct limits upon the possible supply of certain natural resources, but capital, being largely artificial in its make-up, may be increased beyond calculation. For this reason, resource-property tends constantly to increase in commercial value although frequently permitted to lie latent and unproductive. In contrast, capital normally receives no increment in value unless there be an increase in the amount of its industrial earnings. Again there are particular types of natural resources which are limited in amount and which constitute the basic necessities of economic society. In the absence of known substitutes for these necessities, industrial monopolies result from the ownership or control of them. On the other hand, the fluidity of capital and the practical impossibility of a centralized control over its sources and accumulation virtually inhibit any probability of capitalistic monopoly.

The physical limits of natural wealth are in contrast with capital increase.

Natural monopolies vs. capital monopoly.

We shall have occasion presently to refer to these elements of spontaneous value and inherent monopoly which are peculiar to natural resources.

Before proceeding with the analysis of the operation of the principles of investment and interest as applied to conservation, the point should be fixed in mind that individuals react to the future benefits of investment values and the interest premium, and undertake saving and investment only after present needs are gratified to a degree which admits of the voluntary postponement of less pressing desires. Likewise, in the appropriation and use of natural resources, particularly in the period of normal exploitation, no future premium (personal or social) upon their preservation and saving will command much attention when private economic life is a

Private saving and investment are a voluntary choosing of future values.

struggle for existence. Even within the later periods of development and industrial maturity, *immediate needs* are foremost in the consciousness of proprietors; and, until these demands are quieted, neither the future nor society may claim recognition in the administration of privately owned resources. But most persons refuse to save until their incomes exceed by a considerable amount what would constitute a wholesome living. The excess of income over subsistence which, together with the interest premium, will encourage voluntary saving must cover various degrees of comfort and luxury. To many individuals, the interest rate makes no appeal to thrift whatever. In this characteristic aspect of private economics, there is revealed a considerable zone of possible saving within which the desire to gain interest fails to neutralize the personal wish to use up and to spend.

Much wealth in natural resources is immune to the interest rate.

If that considerable sphere of private economic affairs which, as we have seen, lies beyond the influence of the interest rate, is to be invaded by the saving impulse, and if natural resources which are there threatened with exhaustion for present gratification are to be subjected to conservation measures, some more effective principle than self-interest and trust in private initiative will have to be applied in behalf of a lasting national prosperity.

Some Peculiar Aspects of Conservation Investments

Most conservation projects differ from ordinary capitalistic investments in that conservation costs, or investments, are more or less continuous during the period of the project, and financial returns are expected only at the expiration of a considerable term of years. Ordinary investments, on the other hand, yield an annual return from the date of the outlay or soon there-

Compound interest applies to conservation finance.

after. Consequently, it is the principle of *compound interest* rather than that of annual interest which must be applied to conservation finance.

Again, *the form of the investment*, as it is called, is peculiar where conservation is concerned. Most capital investments, not concerned with the development of natural resources, are more or less readily convertible or conveniently transferable. Not so with conservation investments, unless, indeed, large scale corporate operation and management is employed. The private proprietor who practices conservation upon his resource properties must himself see the project through and live out the term of years necessary to its consummation, else, to him, the undertaking is futile. For this reason, the time element, or the futurity of the benefits sought, is a matter for particularly serious contemplation in considering the possibilities of conservation upon private estates.

The futurity of conservation investment is important.

It now seems clear that an increase in the commercial values of natural resources, which shall be analogous in accumulation and amount to compound interest upon the initial value is the absolute minimum of pecuniary expectation which will be necessary to invite the effective exercise of private initiative in behalf of conservation. It further appears that a consideration of the transitory interests of individuals, and a realization of the generally inconvertible form of conservation investments, place rather definite and narrow time-limits upon conservation projects which are compatible with private enterprise. The same reasons suggest the probability that a measure of compensation, over and above the criterion of compound interest, will be required as an offset for the risk of non-maturity when the conservation term exceeds the mathematical probability of the proprietor's survival.

The minimum conservation increment compatible with private economics.

It is theoretically possible, therefore, that the minimum *conservation increment* should be identical in amount with the proceeds of the prevailing interest rate, as applied to the initial commercial values of the resources in question (the *conserve*), continuously compounded for the period of the project. It is also theoretically established that the natural limits of conservation terms are fixed by proprietors' "normal expectancy of life"; and such limits may reasonably be taken to indicate the *natural futurity* of purely individualistic economic interests. If resource owners are absolutely unsocial in their economic interests and if the proceeds of conservation are to be deferred beyond the period of their life-interests, no value increase, however great, will command their consideration when placed in contrast with present commercial values and the delights of present or imminent gratification. It is understood, of course, that this assumption of absolute individualism seldom, if ever, prevails; and, to the extent that selfishness may be tempered by altruism and social regard, the mathematical conclusions drawn from the following illustrations are subject to modification.[1]

Conservation and personal expectation of survival.

Conservation Accruals Illustrated

The accompanying chart is constructed upon the assumption that an available private income having a value of $100 is deferred or invested in the promotion of a conservation enterprise. It is also assumed that the $100-*conserve*, thus incorporated in the natural resource, may *grow* at an annual rate of ten per cent for an indefinite period, as indicated by the length and pitch of the line AB.

[1] For illustrations of the practical operation of the principles here set forth, see Professor Leith's discussion in Part III of this volume.

If funds are worth five per cent, the actual carrying expense of the project, disregarding outlays for maintenance and taxes and expressed in terms of alternative investment opportunity, involves a five per cent interest rate cumulatively compounded to successive amounts indicated by the curve AC; and the undertaking would afford a profit to the proprietor, provided he could mature the project at any time, indicated by the diversion of the curve AC from the line AB. There would therefore be an annual surplus of conservation growth over carrying expenses for about 15 years, as indicated by the location of (M), at which time the $100-value would have grown to $250 at a maintenance cost of $107.89, thus accounting a net conservation profit of $42.11, after which the net surplus would decline for 12 years as indicated by (D). Thereafter, carrying charges would annually exceed conservation-growth resulting in a cumulating loss sufficient to extinguish antecedent conservation accruals at about the middle of the twenty-seventh year.

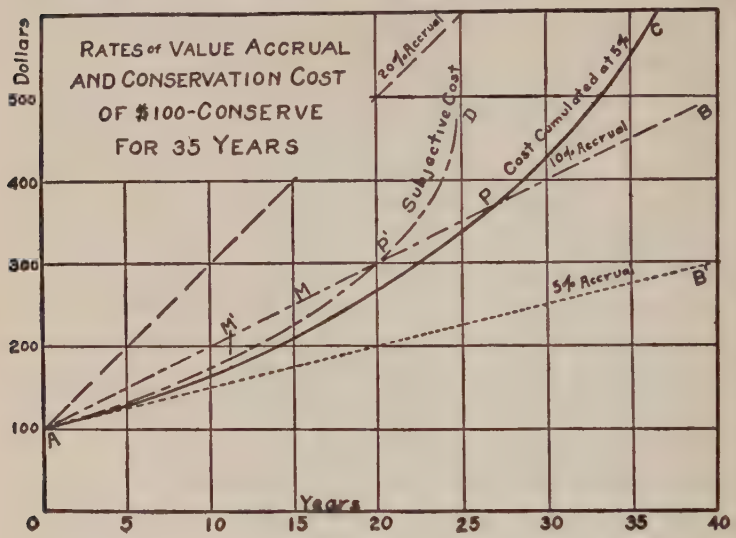
Fifteen years the normal time of a 10-5 per cent conservation project.

Now, if proprietors involved have an average expectancy of life of, let us say, twenty-five years and no pecuniary interest in survivors, this personal subjective factor of uncertain life tenure will not be adequately reflected in the market rate of interest, and they will tend to discount the expected proceeds of conservation at a rate which progresses even more rapidly than compound interest: say, proportionate to the pitch of the curve AD. In this case, the maximum *effective conservation surplus* would be reached at a somewhat earlier date, as indicated by (M′), and a term of about twelve years would seem to span the possible period of private interest in conservation projects promising an average an-

Uncertainty of personal life tenure may reduce normal term to twelve years.

nual value-increment of ten per cent on the investment and maintenance costs.[1]

CHART SHOWING COSTS AND ACCRUALS OF $100-CONSERVE, OPERATING UNDER VARIOUS CONDITIONS FOR A PERIOD OF THIRTY-FIVE YEARS.



Lesser increments of conservation growth would afford correspondingly lower profits and shorter terms. A five per cent accrual, represented by the line AB′ would involve a loss to the proprietor from the start. Conversely, higher rates of annual accrual or lower prevailing interest rates would extend the period and increase the amount of net surplus.

[1] A conservation project, having been undertaken for a twelve-year term, which becomes partly or entirely expired, would logically be subject to extension or renewal according to the continuing expectancy of the proprietor.

SUCCESSIVE CONSERVATION ACCRUALS OF $100 SUBJECT TO RESPECTIVE ANNUAL INCREMENTS OF 10% AND 20%, FUNDS BEING WORTH 5%. (NO OUTLAYS CONTEMPLATED.)

Years	Value Increment		Cost of Conservation	Net Increment		Average Annual Net Increment	
	A(10%)	B(20%)		A	B	A	B
1	$110	$120	$105.00	$5.00	$15.00	$5.00	$15.00
5	150	200	127.62	22.38	72.38	4.48	14.49
10	200	300	162.89	37.11	137.11	3.71	13.71
15	250	400	207.89	*42.11	192.11	2.74	12.81
20	300	500	265.33	34.67	234.67	2.23	11.73
25	350	600	338.64	11.36	261.36	.45	10.45
30	400	700	432.19	—32.19	*267.81	—1.07	8.93
35	450	800	551.60	—151.60	198.40	—5.33	5.96

* Maxima.

From the diagram and table it appears that, if funds are worth five per cent and no outlays are required, conservation projects contemplating an average annual premium of ten per cent on deferred utilization may logically be undertaken on private estates on a twelve-to-fifteen-year futurity, variation being due to the subjective influence of particular life-interests involved. The net conservation-increment at the end of the fifteenth year would amount to 42.11 per cent of the initial value. If a twenty per cent increase in value is anticipated, the maximum conservation increment would not be reached until the thirtieth year, at which time the net increment would be 267.81 per cent, an average annual saving of $8.93 over and above the initial value with interest at five per cent compounded annually, amounting to a gross accrual of $700 on a conserve of $100.

Thirty years the normal term of a 20 and 5 per cent conservation project.

CHAPTER IV

THE RELATION OF PROPERTY RIGHTS AND PRIVATE INITIATIVE TO CONSERVATION

We have thus far indicated in a general way some of the essentials of a conservation policy which may be adjusted to the economic and social conditions within the several stages of industrial progress. We also have described certain limits which the inherent nature of private and personal economic interests seems to impose upon conservation programmes that may deal with privately owned properties and which are therefore subject to the personal wishes and control of proprietors. With these general essentials and limitations in mind, we may now consider the possible methods and results of such conservation measures as may be made effective in a practical way.

Most natural resources of the United States are privately owned.

Since most of the natural resources of the United States are now privately owned, the first question is—what may be done upon private estates to foster and perpetuate the natural springs of human subsistence and to promote the wise development of their industrial powers? There will remain for further consideration the problem of a more prudential administration of resources which are still a part of the public domain; and, finally, there comes the laying down of policies which must inevitably subject the use and development of certain classes of privately owned natural resources to official supervision and government regulation.

We have observed that the chief obstacle to the exer-

cise of social foresight and national thrift in the management of privately owned lands, forests, mineral deposits, etc., is the incompatibility of the long-time view of the social interest and the short-time view of the private interest. Society, like Tennyson's Brook, runs on forever and the span of the nation cannot be calculated. In the public view, therefore, granting a wholesome measure of present general well-being, immediate desires and their satisfaction are of little or no greater moment than probable future wants of like degree. For the nation, the continuous and gradual unfolding of decade after decade for an unlimited period of time is assured, or at least assumed in all matters of public policy. The needs and social values of the future being, in some respects, positively certain, the time-preference which individuals exhibit for the certainties of the present over the uncertainties of the future has no place in public policy. From the social point of view, the absence of limitations of time and the operation of the "law of averages" reduce uncertainty and risk to a minimum. But for individuals, the future is always a risk—a speculation—and a restricted present enjoyment of private possessions in behalf of conservation evokes from proprietors either a stubborn refusal or a demand for compensation and speculators' profits; and such compensation may not be deferred beyond the relatively short futurity of private self-interest. The problem, therefore, is resolved into a query as to the *amount*, *time*, and *certainty* of the conservation increments which will accrue to the proprietors, personally.

The private short-time view vs. the public long-time view.

Time-preference for present goods has no place in public policy.

Individuals must be compensated for chancing risks of the future.

If the future values, which may be enjoyed by proprietors of conserved resources can be shown to be of such amounts and certainty and within such limits of time as

to make them personally preferable to the present values of such properties, self-interest will choose the future rather than the present. Unfortunately, a majority of the proprietors of natural resources have little means of knowing the probable future values of their properties. They may know their present worth, but they cannot calculate the alternative future values which may result from conservation. It apparently follows that *enlightened self-interest* may become a potent aid to conservation of material resources. The first logical step in a practical conservation programme might, therefore, be the revelation of probable future values of natural resources as a means to their enhancement in the opinion of resource owners.

Enlightened self-interest may aid conservation.

Scientists, economists, and industrial specialists are able, in many instances, rather definitely to determine the financial probabilities of restricted exploitation, of thoroughgoing development, and of a careful and intensified utilization of natural resources. The lack of such knowledge and the absence of means of acquiring it are evident on every hand, and are the cause of much innocent waste and misuse of resources which may sorely be needed and will be of great value in a few years.

Experts may advise resource owners.

For many years in Europe, and more recently in the United States, agricultural education has been directed along lines quite in keeping with what we may call the enlightened self-interest principle of conservation. Several well known American corporations which are engaged in the operation of coal-, iron-, oil-, and other mineral properties very recently have undertaken scientifically to measure the increasing demand, growing scarcity, and rising values of their products, and of the natural sources from which they are drawn. Such

American corporations are experimenting with "conservation."

studies, in some instances, are justifying initial frugality, very careful development, and the reinvestment of a large portion of earnings in capital equipment and betterments and for the benefit of employes. The results, of course, are a somewhat restricted and prolonged output at higher present prices to consumers, a longer life and a greater future capacity for the industry, and a larger long-time average of profits or net returns for the proprietors.

High prices and large profits result from saving of some resources.

The capitalistic aspects of the pursuit of *enlightened-self-interests* are somewhat disconcerting to those who are inclined to judge results from the broad social point of view and who observe that the achievement of saving material resources is frequently accompanied by rapidly increasing property values, a higher average of sales prices, and greater total costs to consumers than might otherwise be. This is more particularly noticeable when resources of narrow geographical limits or of small known quantities are concerned. But such high consumers' prices and large proprietors' gains seem not so likely soon to follow from the private conservation of the more widely distributed kinds of resources, such as arable lands, or from the conservation of permanent resources, such as water powers. On the other hand, resource properties which are limited in amount and non-replaceable, such as coal, petroleum, copper, and iron, are obviously susceptible to a kind of conservation based upon private thrift which is of doubtful social value. It is, of course, the higher price resulting from limitation of output that makes the project financially profitable, and a partial or substantial control of the market is always apparent. It has even been suggested that the government should assist private corporations in maintaining higher prices in order that we might simultaneously enjoy more ample

business profits and a more restricted consumption of non-replaceable resources. These essential elements of the situation are generally recognized to be symptoms of private monopoly. Here, it seems, we are forced to the conclusion that the pursuit of enlightened-self-interest in the management of certain types of natural resources brings into play the several well-known economic phenomena of monopoly. Conversely, we might also conclude that natural monopolies may be so managed as to be effective conservation agencies. Now, if private monopoly is dangerous and not to be desired, distinction must be made between (1) natural resources that may not safely be exposed to the free-play of intelligent private initiative and (2) resources which are fairly immune to the menace of monopoly and may safely be entrusted to private management.

Symptoms of monopoly.

The old *laissez-faire* doctrine—that private initiative and unrestrained self-interest always may be depended upon properly to reward individual enterprise and, at the same time, to serve well and adequately the public need—has long been condemned both by logic and by experience. Nevertheless, the fact must not be overlooked that in fields where monopoly does not thrive, within certain limits and conditions, good private business policy usually parallels social welfare. So it may be, under certain circumstances, that wise business managers in their personal seekings after profits in the industrialization of natural resources may serve well the public interest in the development and conservation of industrial power. But the limits and conditions of this successful coördination are very real; and the symptoms of monopoly, effective or incipient, are more

Laissez-faire is inadequate.

Good business may parallel social welfare.

often present than absent. The final test of compatibility of personal and public motives lies in the correlation of ultimate private benefits and general economic well-being—the former being measured in the monetary terms of profits and values; the latter being measured in the quantitative terms of material goods. When private managers so readjust their administration of resource properties as actually to render mutual and commensurate advantages both to owners and to society, they will have demonstrated the feasibility of conservation through private business acumen and should be unhampered by governmental interference.

The test of compatibility of private and public interests.

There is reason to believe that a beginning has been made in the promotion of social economy by the medium of enlightened business methods. Forecasting the future of demand and supply and calculating consequent future values by accurate methods of cost accountings and statistics is becoming a teachable art. Through educational methods, including actual demonstration, private owners may gradually be induced to practice economies by the weighing of calculated future values against present worth. Doubtless, if financial gains reasonably to be expected within conservation terms not exceeding fifteen to twenty years, were to be calculated and made known, a considerable economy of natural resources would automatically result.

Private advantages of conservation may be taught.

Much exploitation and pioneer development is profligate of natural resources because of the pressure of present necessity and a lack of sufficient capital to bring resources to an efficient state of productivity without exhaustion and waste. The thought logically occurs that, if adequate developmental capital were available, much destructive exploitation would be avoided. In

Adequate developmental capital reduces exploitation.

other words, if a credit system could be devised by which the necessary developmental capital would be made available to new industries and new industrial communities, the "stage of exploitation" would be shortened. Furthermore, if the development of natural resources were always undertaken upon reasonable margins of safety as to time required and probability of success, combined with good faith and integrity of management, it is clear that more capital and lower priced capital would become available. The speculator and "speculative capital," seeking uncertain and perhaps unethical projects and demanding quick returns and high rates, are not the benefactors of industrial society they were once supposed to be. We are tempted here to anticipate something of the succeeding chapter and to suggest the possible value of supervisory regulation of motives, methods, and personnel of developmental projects.

Certainty and integrity should be substituted for speculation.

The compensatory relation between developmental capital and the exploitative destruction of natural resources has long been apparent in practice; but, even now, this relation is very generally disregarded in the economic thought and public policy of this country. Deforestation, soil exhaustion, oil and gas waste, and the spoliation of coal deposits—largely due to ignorance and carelessness, perhaps—have been stimulated, and frequently necessitated, by a lack of developmental capital and the requirement of high interest rates. The illogical variation in customary interest rates, from five per cent a year in the East to two per cent a month in the Northwest, is a significant historical factor which has unduly promoted the intensified industry and density of population in low-interest regions, and has restrained settlement and development and prolonged exploitation

Uniform interest rates would aid conservation.

of natural resources in high-interest regions. In this we should realize that conservation, which implies an effectively coördinated utilization of all economic agencies, is closely related to equality of industrial opportunity and to the fluidity of capital and population within the national boundaries.

In entering upon questions of conservation finance, two fundamental facts present themselves—First, any conservation scheme is futile which restricts an owner's arbitrary use or disposition of his lawful possessions unless it avoids the anomaly of inviting him to undertake a virtual investment which he cannot financially afford; second, any plan of conservation finance—the raising of capital for reclamation, development, etc.—which fails to incorporate the essential investment attributes of certainty, flexibility, and convenience will not command the support of private funding institutions of existing types.

Two principles of conservation finance.

The general aspects of conservation finance are well illustrated by the funding problems recently presented by the rather disastrous reclamation experience in several western irrigation states. In providing capital, the proprietor has a possible choice of two alternatives; he may himself assume the rôle of capitalist, or he may fund his project by soliciting credit and pledging his properties as security. By the latter process, which is the usual one, conservation projects are brought into competition for financial support with the more or less standardized types of contemporary commercial and industrial activities.

The necessity of credit and the competition of other forms of enterprise.

The possessor of *convertible commercial assets* may customarily command credit which enables him to borrow at his convenience any amount up to a half or three-fourths

of the present worth of his possessions. In this way, in the event of delayed commercial processes, he may level his income-flow and meet his present financial obligations by discounting his anticipated revenues to cash in hand at his bank. Likewise, the industrial promoter calculates the necessary lapse of time pending the maturity of an undertaking and the probable annual revenues and commercial values to follow, and, upon the pledge of such *definitely timed and estimated future values*, funds may usually be had by the placing of mortgage loans and the issuing of bonds.

The commercial borrower has convertible assets.

Definitely timed industrial projects may have good credit.

If, however, the seeker after funds be the proprietor of *conserved* natural resources which are to become available for use or marketing after the lapse of an *indefinite time* or after a *very long period of time*, his assets are not "convertible." Existing credit agencies view with disfavor securities which may change in value at uncertain and irregular rates, and most studiously do they avoid the placing of funds upon projects of distant and indeterminate maturity. Consequently, the proprietor of latent or fallow natural agents—the would-be conservationist and benefactor of society—occupies an unfortunate position as regards financial power, despite the fact that his resources may be of great potential value and his project most worthy.

Resources subject to conservation are not "good security."

Doubtless, short-time conservation projects on private estates may be financed successfully, even when credit is necessary to enable proprietors to defer utilization. Credit periods, however, must be limited to maturities (1) which may be adjusted to customary funding arrangements and (2) which are confined to such lengths of time as are within the scope of the probable business activities of proprietors. The failure

Existing funding institutions are not adapted to the needs of conservation.

of either of these conditions removes the possibility of advancing conservation by means of private credit under the present organization of our credit institutions, and, in fact, destroys the incentive of owners to carefully develop and husband their resource properties.

These obstacles have already grievously limited private initiative in the field of irrigation and drainage development and have made the assistance of public credit and governmental initiative imperative— not only in over half of the American states, but wherever great areas of land are subject to reclamation. In this situation, the contradistinction between private economics and public economics, in their relation to conservation, is strikingly revealed and effectively demonstrated.

Inadequate financial support has necessitated government aid in reclamation.

The attributes of credit as a means of facilitating conservation by reducing destructive exploitation and supplying developmental capital within the sphere of private enterprise are worthy of somewhat further comment. The nature and basis of credit are widely misunderstood and its functions are very narrowly interpreted by many bankers and apparently by the members of most legislative bodies. For this reason credit practice and the law of credits are quite unscientific and inadequate. In the past, credit has been too closely identified with "a promise to pay," with "the security of present values," and with "cash reserves." Credit—especially developmental credit—is in no logical way to be related to cash reserves. Credit is itself *cash*, i. e., a present purchasing power in the hand of the borrower, based upon the probability of his *future ability* to recompense the lender. Now, future ability rests neither upon promises nor upon present values, but results from commercial values to be realized

Credit practice and credit law are unscientific.

in the future from the intervening processes of industry and economic evolution.

Conservation a neglected field of financial opportunity.

Adequately constituted funding institutions might very properly, safely, and economically arrange long-time credits and supply developmental capital upon the security of carefully calculated future values to be realized from conservatively managed natural resources and wisely matured industries. American bankers, aided and abetted by misguided legislators, have neglected for fifty years a great opportunity and responsibility by their failure properly to organize developmental finance.

Recent banking legislation will aid conservation.

However, few people suspect the possibilities of recent and probable changes in the American banking system in the promotion of conservation by reducing exploitation and stabilizing industrial development. The equalization of interest rates already being accomplished by the operation of the Federal Reserve System is a very appreciable advance in this direction. The establishment of farm-credit banks will contribute to the same end, and the growth of properly supervised rural credit associations may also assist.

Official supervision is a necessary sanction of developmental credit.

We must not overlook, however, the necessity for an administrative supervision of industrial undertakings and reliable calculation of future values if the customary devil-may-care speculation and exploitation are to be displaced by the more substantial principles of safe-and-sane social and private business indicated above. Now, the instruction, supervision, and safe-guarding which will constantly be necessary to create and foster a salutary degree of enlightened self-interest in industrial development can be nothing short of official regulation. At best, therefore, private initiative in the management of natural resources may function in

accord with the needs of both private and public interests only when subject to the direction of supervisory and mandatory governmental agencies.

Private initiative in business management as elsewhere is primarily responsive to the motive of self-interest. It is a mistake, however, to disregard other things which stimulate the efforts of successful industrial managers. There is a rapidly increasing number of business men who have demonstrated their ability and satisfied their desire to "make money" and are now generously inclined to bend their energies and to sacrifice pecuniary opportunity to the promotion of public projects. Occasionally, this mantle of good-will toward mankind is found to conceal self-seekers after the social and political prestige which always falls upon the seemingly successful and public-spirited citizen. But the contribution to conservation resulting from uncompensated individual patriotism and broad-mindedness is by no means negligible; and this most desirable type of public spirit and stimulus to social thrift may be successfully developed by a popular defense of altruistic educational ideals and the promotion of broad standards of political and business ethics. Herein lies a suggestion of one of the greatest responsibilities resting upon the colleges and universities of the nation—a responsibility which the so-called "business administration" of educational affairs seems studiously designed to neglect.

The public spirit of individuals advances conservation.

Civic responsibility a neglected educational task.

On a previous page, there are mentioned four personal qualities and conditions which tend to restrain individuals from undertaking present economic sacrifice in the promotion of future values and prosperity. These restraints are—the pressure of present personal needs, lack of foresight in calculating

The abstinence of conservation discommodes individuals in the use of their property and income.

future benefits, limited expectation of life, and the casual interest of individuals in the general social prosperity and the national welfare. Since the practice of conservation cannot escape the exercise of abstinence, although such undertakings may be sound investment projects, these restraints become very effective when the control of private property and personal incomes is involved.

The technical advantage of the corporation over the individual conservationist.

If, however, private corporations instead of natural persons are the proprietors of natural resources concerned, the situation as represented above is materially changed and the outlook for successful conservation is much improved. There are several advantages which apply to corporate ownership, when contrasted with individual ownership, in the management of natural resources subject to conservation. They include the following:

Succession.

1. The legal attribute of "succession" which, in a degree, relieves the corporation from the restrictions of a brief and uncertain life term.

Convertible assets.

2. The relative ease with which the personally owned shares in corporate property may be transferred and converted into cash at any time.

Finance.

3. The superior funding capacity of the corporation which removes its investment projects from the limitations of personal financial ability and from the direct competition of pecuniary necessities of a personal and private nature.

Large-scale operation.

4. The broad scale of operations, both as to time and place, which may offset the costs of conservation against the profits of exploitation or of mature industry.

Possible monopoly.

5. The possible centralized control of such a part of the supply of certain limited resources as to establish actual or potential monopoly.

6. The possibility that corporate management, being of

expert and intelligent quality and somewhat removed from the more immediate interests of private proprietorship, will reflect the social interest and public welfare, in so far as it may be thought to comport with the pecuniary interests of stockholders.

Expert management.

These attributes of the private corporation clearly remove corporation policies and business activities from the atmosphere of *private economics* in the narrow and customary meaning of the term. Corporation policies and activities, although concerned with private pecuniary interests in most instances, deal with such interests collectively; and collective interests being once established and recognized, the distinctions between motives, methods and policies of the smaller constituencies of private corporations and the larger constituencies of states would seem, theoretically at least, to be a matter of degree. Indeed, in recent years, economists have formulated a body of principles and doctrines which they designate as *corporation economics*, and which occupies a middle ground between the customary fields of "private economics" on the one hand and "public economics" on the other.

"Corporation economics" occupies a middle-ground between private economics and public economics.

If the reader will refer to the corporate characteristics indicated on the previous page, it will be seen that the practices of corporation finance which logically result therefrom will pretty thoroughly neutralize three of the *disabilities* which tend to restrain individuals from indulging in conservation. Since corporation capital is largely drawn by small individual contributions from private surplus and savings, the pressure of the ordinary subsistence wants is practically unknown to the corporation. The recognized qualifications of corpo-

Certain disabilities of individual industrial management are removed by corporation management.

ration officials and their access to expert and specialized counsel afford superior foresight and accurate calculation of distant results of present policies. Furthermore, the permanent nature of the corporation and the ready sale and transfer of its shares places it above the natural disabilities of an uncertain personal life tenure.

Corporation management may improve outlook for conservation.

No extended demonstration is necessary to reveal the certain superior qualities of the corporate form of business organization as a vehicle of conservation. Long-time undertakings and large-scale activities, coupled with the powerful capitalistic machinery of corporate finance, may render corporations virtually immune to those personal economic necessities which compel destructive exploitation and mushroom development under individual and small-scale enterprise. The fact of this superiority, however, by no means solves all the problems of conservation. Certain pertinent questions at once suggest themselves—*First*, within what spheres of activity may the corporation operate; and where in conjunction with and where to the exclusion of individuals? *Second*, may there not also be peculiar disabilities which attach to the corporation as a benefactor of society in the stewardship of natural resources?

The limits and results of corporate power are uncertain.

The first question is not easy to answer. While it is clear that many activities involving the utilization of natural resources may easily be brought under corporate organization, some, especially agriculture, seem far removed from such a possibility. Indeed, this question suggests a multitude of economic controversies associated with competition, combination, trusts, et cetera, and touches upon elements of social and political philosophy which are far removed from conservation, but which imply that there are other limitations upon the range of corpora-

tion activities which may have to be taken account of. An extended discussion of these matters does not seem profitable here. It should be observed, however, that the economic, social, and legal status of the corporation is in a state of very rapid evolution, and any analysis of this problem of the metes and bounds of corporation activities requires the gift of prophecy as well as a thorough knowledge of present conditions.

In answering the second question, one will recall that the five technical merits of the corporation do not remove or displace what we have called "the perfunctory interest of individuals in general social prosperity and national welfare." It is true, as we have above indicated, that corporations may, and occasionally do, temper their policies to the sensibilities of the public. Experience is convincing, however, that such tempering is often preceded by a rather thorough shearing and is sometimes administered as a possible tonic to the next year's fleece.

Corporations serve public interests as an expedient to private motives.

The most striking economic aspect of natural resources is that they provide and include the material essentials of social existence; and some of them are so limited in extent, so difficult of access, and so necessary to the maintenance and progress of society, that their ownership and management afford opportunity for the development of the most powerful devices of human dictatorship ever conceived, namely, *natural monopolies*.

Natural resources provide opportunity for monopoly.

When the management of natural resources, through ownership or otherwise, becomes so centralized as to make possible, in any degree, an arbitrary control of production output or market prices, we know that monopoly surely exists. The net results of effective monopoly under private management are restricted output

Monopoly may restrict output and exact high prices.

and abnormal profits. The fact that large industrial combinations may restrict the quantity of their output and thus defer the exhaustion of certain natural resources entering into production is occasionally paraded as an effective form of conservation. We have frequently heard of late that, in view of possible future shortage, the supply of mineral oils, of coal, or of lumber is being conserved—and the price is raised. Higher price is the effective restriction upon consumption—the lever which impels "conservation." Superficially, there appears to be an actual saving in this scheme of "conservation." Certainly there is a saving in the supply of coal, oil, and lumber; but the price that the public has to pay is always higher and the monopoly profits gained by proprietors are usually greater than otherwise would be the case. This process constitutes what we may call the *exploitation of the market.* The increased economic sacrifice of consumers and the greater affluence and probable extravagance of monopolists are *per se* destructive of general economic strength. Whatever conservation of particular natural resources may be accredited to monopolistic control of markets is doubtless more than offset by the weakening of the economic structure at some other point. It is possible that the situation might be saved if the increased receipts resulting from higher prices were subject to an extraordinary tax and thus turned into the public treasury.

Monopoly-conservation causes exploitation of the market.

Exploitation of markets weakens economic structure.

As a general rule, when the social benefits resulting from an alleged "conservation" device are not proportionate to the private gains which result from its operation, we may assume that the enterprise is misnamed—such conservation is counterfeit. Moreover, when the quantitative saving of natural resources is the result

The test of counterfeit conservation by monopoly.

of a higher average of prices to private producers for their products, the evidence of monopoly control and price manipulation is fairly conclusive. The probability of any considerable net public benefit emerging from such exercise of private monopoly power is not hopeful.

The corporation with its superior financial technique, with its peculiar adaptability to large-scale and long-time operations, and with its well-known legal strategy is uniquely fitted to the promotion of natural monopoly. It is not necessary that a single corporation shall secure exclusive possession of all supplies or sources of a given kind of natural resource in order to establish a monopoly. If a group of *associated* corporations are able to act together in the management of a majority of such sources, or even in the control of a minority of them if they secure the richest or most favorably located ones, a monopoly is generally possible. Such a condition probably now exists with regard to anthracite coal. Monopoly may also result from the control of some essential process in the commercializing of a natural resource such, for instance, as the refining and transportation of oil; or perchance, the lever of control may be composed of exclusive financial and organization advantages such as is apparent in the steel industry.

The corporation is peculiarly fitted to the development of natural monopoly.

Since private monopoly and true conservation are essentially incompatible, it must appear to thoughtful and reasonable people that, in so far as corporations may covet monopoly gains, they will be out of sympathy with the aims and objects of conservation. It must further appear that, in so far as corporations may effectively exercise their bent for monopoly power, they will prove their unfitness to act as the custodians of such natural resources as contribute to the

Corporation policy may jeopardize public interests in management of resources.

necessaries of social existence and progress and which are so limited in extent as possibly to become subject to a centralized business control. Here again, the suggestion that private interests and private initiative tend to controvert the sound and adequate principles of conservation is spontaneous. Even the superior efficiency, foresight, and financial qualifications of the private corporation, if permitted to function unaided and undirected, afford no assurance of loyalty to the nation in the management of its natural resources.

The hoarding of natural resources constitutes a second type of pseudo-conservation which may prove quite as indefensible as is the maintenance of natural monopolies. When proprietors withhold from development and from the market resources which are valuable and useful—for which there is a social need and a commercial demand—the action is usually inspired by a vicious type of speculative motive. We do not go so far as to say that all speculation in natural resources is unsound, particularly, if the resources concerned are of consumable and non-replaceable kinds. Certain types of speculation are quite within the scope of legitimate industrial policy and when moderately applied to natural resources, may be tolerated if not encouraged. But if resources are deliberately held out of use and are of such varieties as would not be destroyed or caused to deteriorate through use, such speculation is, in most cases at least, selfish and unsocial. The withholding of productive arable, industrial, and residential lands from occupation and from socially beneficial utilization in order to profit by the natural increase in values—the so-called "unearned increment"—is a favorite and customary form of speculation. Water power is another natural agency which just

The hoarding of natural resources.

The "unearned increment."

now offers a favorable speculation. An investigator has recently published convincing evidence that two great public utility organizations, the Stone and Webster and the General Electric groups, are systematically acquiring control of the undeveloped water-power resources of the nation.[1] We have no positive knowledge of the purposes of these two great organizations. We do know, however, that the rapidly increasing dependence of industrial and commercial activities upon hydro-electric energy will, at an early date, place magnificent values upon water-power sites. We know that tremendous speculative profits are assured by the acquisition and holding of such properties without the expenditure of a dollar of capital in their development. We know that the sources of industrial energy are so limited that the centralized and unregulated control of water power in the hands of a few private corporations would soon become the basis of one of the most powerful natural monopolies which may possibly be conceived. Thus, again, we find the seeds of future economic discord between the serving of public necessities and the privilege of private wealth-getting being sown by the superior foresight of great private corporations.

Speculation in water-power sites.

This review of the possibilities and limitations of successful conservation upon private estates and under private initiative and management plainly leads to the definite conclusions that, aside from public ownership or mandatory regulation, four means of restricting the apparently selfish and wasteful practice of individual private owners of natural re-

Some essentials of conservation policy.

Education.

[1] Webb, H. W., "The Concentration of Water Powers," in *Journal of Political Economy*, October, 1916.

sources are, to some degree, possible—(1) An educational programme for the promotion of "enlightened self-interest". (2) The creation of a credit system which shall recognize and calculate the excess of future values of conserved resources over their present values, and upon such calculations offer proprietors the alternatives of *present utilization* or *compensatory credits* of equal values, plus annuities approximately equal to the increasing values, due to conservation. (3) The development of altruistic and benevolent ideals among proprietors as to the use and disposition of their property. (4) The gradual substitution of corporation management of natural resources for individual ownership and initiative.

Credit.

Social consciousness.

Corporation management.

Our conclusion may also be extended to a statement of the very positive limits of the palliatives just enumerated. (1) Enlightened self-interest affords a useful conservation principle, not because the resulting motives of private initiative are more in accord with public interest; but because, within certain spheres of enterprise, the material results of intelligent private initiative are less destructive of industrial capacity to serve future needs. (2) Many resources, properly subject to conservation, may not reasonably be expected to become acceptable security for credit extension. Mines of unknown content, forests subject to fire risk and uncertain taxation, and water rights of indefinite future utility do not lend themselves to a calculation of future increments and values sufficiently accurate for a basis of credit. Proprietors of such resources are practically without bankable securities and, when in need of funds, must resort to exploitation and hasty development and must bait speculative opportunity. (3) The superior economies of corporation ownership and

Limitations upon above agencies.

operation of natural resources, although at times of considerable social value, are, mainly if not entirely, the by-products of efficiency in the service of purely private pecuniary interests. (4) The growth of natural monopolies, under the régime of corporation dominance in the development and management of natural resources, affords final and conclusive evidence of the impossibility of adequate and effective conservation unless there is brought about a more effective public control of private property.

The final necessity of restriction of private property.

CHAPTER V

PUBLIC POLICY AND CONSERVATION

The one outstanding conclusion to which the discussion thus far has brought us is that, however much may be done by individuals and by private business organizations to husband the natural resources of the nation, the formulation and execution of a comprehensive conservation policy is fundamentally a government function.

Conservation is a government function.

We have seen that practically every impulse which moves the individual to conserve natural resources is either inadequate or ineffectual because it originates within the springs of personal interest and its action is primarily confined to the realm of private affairs and individual relations. We do not deprecate the prudentially far-sighted and, in some cases, benevolent business policies of many individuals and corporations in the utilization of their resource properties. The fact remains, however, that the economic interests of individuals and groups of individuals, even of certain generations of individuals, because of the impulses to which they respond and the purposes toward which they strive, are casual, transient, and discordant when considered in their relation to the continuing life and needs of a rapidly growing society. Universal experience clearly demonstrates that a definite public policy and positive governmental action are necessary to socialize private agencies and to mould them to the larger structure of a dynamic society.

The individual impulse is inadequate and ineffectual.

Now, in the final analysis, the sole function of government is to supplement and direct the social and economic activities of individuals so that all may enjoy collectively the national guarantee of safety and prosperity. The public policies and the political organizations which sanction the exercise of authority over persons and property—which, indeed, define and authorize the existence of "persons" and "property"—constitute the mechanism of social control. This machinery of government should be so designed and operated as, first, to sustain if possible the wholesome essentials of the existing order of social well-being, second, to anticipate as well as may be the needs of the future, and finally, to promote such economic, intellectual and æsthetic progress and improvement as are possible. In attaining these objects, the prudential management of natural resources is destined to be a most powerful factor. We have before us, therefore, a very natural or normal aspect of government, the exercise of public authority under conditions which are bound to develop in any nation when the growth and needs of the population bring a scarcity of the natural agents of production within the probabilities of the rather definite future. A realization of this condition has only recently intruded itself upon the people of the United States. The necessity for government regulation of railways, of municipal utilities, of banks, and of many professions, in behalf of the public interest, has long been recognized and the practice has become a custom. All of these regulative measures involve the public control of the conduct of persons and of the use of property. Conservation of natural agents of production is the next logical step in the same direction, for the same purpose, and upon like principles of government.

Government is social control in behalf of collective safety and prosperity.

The necessity of public authority.

We may pause here to state very briefly, and perhaps too tritely, some underlying principles of government which will be accepted as axiomatic as this discussion proceeds—

1. Democratic government is pledged to the protection and promotion of the collective interests of its subjects, holding that policies consistent with the permanent welfare of the many must be tolerated by individuals who may occasionally be discommoded by regulative measures.

Individuals must tolerate regulation.

2. The flexibility of a democratic government permits it to reflect both the *needs* and the *qualities* of its citizens; consequently, the efficiency of such a government at any time will be directly proportional to the pressure of public need and to the intelligence and integrity of its people.

Democratic government reflects needs and qualities of citizens.

3. In promoting the general welfare, government may exercise its authority upon individuals by restriction, by direction, and by the stimulation of private initiative.

Government by restriction, direction, and stimulation.

4. A correlation of public policy and private initiative in industrial practice which may bring about that full and perpetual flow of productive power which is the purpose of conservation is becoming imperative. This will require the gradual abandonment of some outworn dogmas of the limited "sphere of government" and the "rights of individuals"; and will substitute therefor an evolutionary policy of collective welfare, long-time human interests, and subordinated private rights—to be administered by newly designed and scientifically qualified governmental agencies.

Necessary abandonment of obsolete dogmas.

Enough has been said in the foregoing chapters to indicate pretty definitely the general aims and purposes of

wise government in such official action as may be brought to bear, as time goes on, in controlling or directing the private appropriation and utilization of natural resources. This, it is to be remembered, is an evolutionary matter which progresses in harmony with the social and industrial transitions observed in passing through the various stages of exploitation, development, and mature organization of natural resources.

It would, of course, be quite futile to enter upon the details of a conservation programme in this short chapter. Although the motives, methods, and results of a contemplated programme may be made to appear quite definite, when stated in general economic terms; the technical structure—the political, legal, and administrative essentials of such a programme—and the necessary social and institutional readjustments involved are matters of uncertain moment and of continuous change. For the present, it will be sufficient merely to indicate the main lines along which a constructive policy may be advanced, and to describe some of the initial and fundamental steps which will carry us towards the substantial achievement of a permanently sound national economy. In so doing, let us keep in mind that a given goal may usually be approached by devious routes and that like results are often achieved by a variety of methods. It is well also to understand that dogmatic custom, obsolete legal institutions, and political chicanery are omnipresent obstacles in the path of social and economic progress. Because of obstacles of this nature which must be overcome, rationalistic principles alone are inadequate, and patience, indirection, and compromise become useful and necessary artifices in the formulation and promotion of practical conservation plans.

No detailed programme should be formulated

Different methods may be equally effective.

In the suggestions which are to follow, the present writer makes no claims of originality, nor is there a desire to imply that there may not be other measures which would prove as applicable and effective as those proposed. When conservation shall have become a "going" public policy and a generally recognized essential of national stability, it will involve very little of either theory or practice that is entirely new. In a previous part of this book Professor Ely has cited some of the earlier teachings of conservation doctrines in this and other countries. There are numerous interesting suggestions in regard to the better use of natural resources in the annual reports of several Secretaries of the Interior, and in many proposals concerning land, mineral, and irrigation policies which have been brought before Congress and the state legislatures. The conservation agitation which developed during the Roosevelt administration gave rise to much fragmentary and casual thought and literature upon the use and abuse of natural resources. The internal policy of Germany, the land problems of Ireland and France, and the land, mineral, and forestry policies of Canada, Australia, and New Zealand supply us with observations which serve as laboratory experiments and lead to some valuable conclusions as to the proper lines along which to develop the administrative supervision of our natural resources. The writings of President Van Hise, of the University of Wisconsin, constitute the only serious and comprehensive attempt definitely to focus both an illuminating knowledge of physical properties of natural resources and a wise judgment of the social needs of the future upon the problem of *conservation versus national profligacy* in their use.[1]

The suggestions of Ely, Roosevelt, and Van Hise.

Foreign experience and conditions are suggestive.

[1] Van Hise, *The Conservation of the Natural Resources of the United States.*

Since we find that in practice conservation is primarily a matter of government regulation, it is well to refresh our minds as to the meaning of *regulation* and the general methods by which it is achieved. It is always to be understood that where regulation becomes necessary there is more or less conflict between the public interests and private interests; and regulative agencies are exercised in behalf of the public, since, otherwise, society is defenseless against the persistent aggression of individuals who are motivated by personal desires. It is convenient also to distinguish between the two general principles upon which regulative policies proceed, viz., (1) *enlightenment* and (2) *compulsion.*

The meaning of regulation.

Educational and advisory agencies, particularly in recent years, have been a most effective means of regulation in nearly all business matters of public concern. Compulsion may be exercised in many ways some of which are mandatory and direct and others of which are quite indirect but none the less effective. As has been emphasized on a previous page, compulsion may *suppress, guide and direct,* or *stimulate* the activities of private persons. Again, since natural resources are objects of public and private property, we may conveniently differentiate regulative measures upon the basis of the *nature* and *use* of the properties involved. Originally, natural resources are the property of the public, being included in the *public domain.* Under provisions of public land policy, such resources may be "occupied and appropriated" for private use. They always remain, however, in a sense *public* and are included within the *national domain* and are subject to a limited public authority. Furthermore, having once become private property, resources may be reconverted to the *public domain* and to

Two principles of regulative method—enlightenment and compulsion.

public use if public convenience and necessity so require.

In a preliminary way, we may conveniently describe regulation in behalf of conservation as applicable to natural resources as they exist under either of two forms of proprietorship, and to resources subject to or in process of transfer from either form of ownership to the other form, viz.—

(a) 1. Natural resources within the public domain (public property);

Four loci of conservation control.

2. Natural resources which have been legally withdrawn from the public domain for private use (private property);

(b) 1. Conditions under which resources are converted from public property to private property;

2. Conditions under which resources are withdrawn from private property and returned to the public ownership for public use.

If the reader will refer to the general conservation measures proposed in Chapter II as needful and feasible under conditions obtaining within each stage of industrial evolution, and if he will then reflect upon the limitations and disabilities of individuals and private enterprise which are indicated in Chapter V, the logical course of public policy in the furthering of conservation under any given condition becomes fairly clear. Accepting as typical the conditions portrayed as existing in the different evolutionary stages, let us briefly examine the possible operations and results of such regulative measures as appear reasonable and possible.

The necessity of resource classification.

During the early stages of settlement and industrial development, the first problem of conservation is carefully to segregate such natural resources as may be wisely appropriated to private use and to pre-

serve all others unimpaired for the future. The initial regulative measure, therefore, is the logical classification of natural resources with regard to their various functions, the possibilities of both present and future uses, and their relative importance in serving private and social needs. Professor Ely, in a foregoing chapter of this book (Part I, p. 23), has so adequately treated the essentials of resource classification as to make further treatment superfluous. It is sufficient to say here that such a classification should so clearly set apart each of the basic industrial elements incorporated within the resources of nature that each private property right to be established by the appropriation of a natural resource may be confined to a particular class and a particular use. Thus, the transfer of resources from the public domain to private property may be made for a specified purpose only. If land is acquired from the government for agricultural purposes, only agricultural and allied uses should be granted. Minerals beneath the surface (known or unknown), waterfalls, fisheries, and timber within the boundaries of such an area, being classified separately from the soil and not essential to its agricultural use, would remain property of the public for separate disposition.

Basis of classification.

Most thoughtful persons are now convinced that resources of potentially great social value and necessity, and which are liable to scarcity, should always remain in the public ownership subject, of course, to such private uses as may be socially feasible at any given time. A proper classification would, therefore, indicate certain resource properties which should never be subject to alienation from the public domain—fisheries, mineral fuels, water powers, irrigation streams, and some forests. The variety of conditions which may prevail from time to

Some resources should remain in the public domain.

time with regard to particular publicly owned resources may, under wise regulation, make their *private use* subject to leasing and royalty arrangements, or even free. The important point is that their use shall be subject to control and to continuous adjustment to social convenience as well as to private needs.

Reasonable use as a condition of ownership.

When public policy favors the transfer of resource properties from public ownership to private ownership, a *reasonable use* of such properties should be required as a condition of private title. This we believe to be a general principle worthy of serious consideration. There should be exceptions, of course, to such a rule; for example, urban lands held for future use and subject to reasonable taxation, with possible limits as to time and amount. This rule of *beneficial use* has for a long time obtained as the primary test and measure of irrigation water-rights in the arid west. Its counterpart, "assessment work" or reasonable development of mining claims, is even of longer standing as a sanction of private property in natural deposits of the precious metals. The long familiarity of the writer with the operation of this rule of private appropriation of public waters and mineral resources leads to the conviction that it is the most expedient and least wasteful doctrine of establishing private property in natural resources. Furthermore, it is democratic, it reduces the incentive to speculation and, finally, it recognizes the perpetual power of the State to bring about readjustments in its control through the flexibility of legislative and judicial construction and interpretation of the phrase "beneficial use."

A western illustration—mineral and irrigation rights.

There is a section of the constitution of Colorado which has been copied into the fundamental laws of many western States, declaring that *the water of every natural stream is the*

property of the public, dedicated to the use of the people of the State, subject to priority of appropriation and beneficial use. If that remarkable provision had been so written into the federal constitution as to apply with equal significance to the appropriation of all natural resources, properly classified, the wasteful exploitation of the public domain would have been avoided and the more troublesome and difficult problems of conservation would have been automatically solved.

The Colorado doctrine.

We have to deal, however, with a condition which has, in the main, passed beyond the operation of any rule regulating the transfer of resources from the public domain to private fee. What, then, may yet be done to restrain misuse, direct better use, and promote wise use of *privately owned* resources? This problem must be approached with the clear understanding that property rights in natural resources upon which society is dependent for its very existence constitute a *public trust* and that such rights place upon private proprietors a responsibility not always associated with private ownership. In brief, resource properties are not to be considered as purely *personal properties*. Inevitably, the qualification of property rights must follow the nature of property uses.

Privately owned resources a public trust.

The possibilities of enlightenment, as a stimulus to conservation—the appeal to personal intelligence and ethical ideals, and the influence upon individuals of scientifically informed advisory agencies—have already been discussed and need be mentioned but briefly here. This is a matter, nevertheless, to which public policy may well attend and to which government may lend itself with much benefit to the public. Within this field of public industrial education, little has been done in this country, and we are sorely in need of competent and continuous

Enlightenment as a conservation force.

direction and of more advisory regulation in the use and development of natural resources. Such regulative measures as are necessary for this purpose may be *established* by statutes and ordinances, but they may not be effectively *maintained* by the legislative bodies and by the courts. Permanent and non-partisan administrative commissions and bureaus are necessary, and the personnel of such agencies must be of a quality worthy of the highest public confidence.

The police power and conservation.

The control of private property in behalf of the general welfare may in certain respects be accomplished directly by the exercise of the *police power* and by the operation of the *taxing power* of government. Both of these governmental powers are mandatory. For our present purposes, *the police power may be defined as the authority vested in the government (legislatures and courts) to restrict certain uses of private property and private contract when their exercise jeopardizes the general welfare.*

Taxation, although primarily designed for the purpose of providing revenue for the maintenance of government, may be made to operate so as to control the conduct of persons in the possession, use, and disposition of property. The police power is now being widely exercised by administrative commissions in the partial management of private property which is used in the so-called "public utilities." A number of legislative acts, supported by judicial decisions, have designated railway, gas, electric, and water service as "public utilities" and such businesses are understood to be burdened with a "public interest." The

The public interest in sources of social necessities.

properties used and useful in such services are legally held to be *not purely private* but essential to the needs of public convenience and necessity and subject *to public regulation.* Now, a "public interest"

may likewise be established, legally, in such natural resources as are of actual or potential social significance. It is within the scope of public policy to recognize water powers, irrigation streams, coal and oil deposits, et cetera, as of paramount social importance; and legislatures and courts may declare all such properties legally subject to public control, and may provide such administrative bodies as are necessary to exercise this control. There is, even now, a marked movement in this direction. The irrigation policy of the arid country, the water-power policies of California, Oregon, and Wisconsin, the Alaskan coal-lands policy, and the growing demand for nationalization of the industrial minerals of the nation are significant of the new rôle of the police power. In the expansion of the police power we have perhaps the greatest single agency of effective conservation.

Potential aspects of the police power.

Taxation is a regulative tool which may be made very useful or very harmful to conservation. An annual ad valorem tax upon resource properties may be made to stimulate the exploitation of such resources as mines and forests, and thus may defeat the objects of conservation. A like tax upon unused and unimproved agricultural or urban lands may hasten their development and use, and will discourage over-liberal appropriation of lands from the public domain by speculators and thereby promote conservation. A "tonnage" tax upon the output of mines, or a tax upon the "cut" from a forest property, can be so manipulated as either to stimulate or restrict the output of ore and of lumber according to the demands of conservation. Such taxes may also be so adjusted as to deprive private proprietors of monopoly gains and "scarcity profits." High prices, resulting from monopoly or scarcity, may in this

Taxation as a conservation tool.

The "tonnage" tax.

way be made to contribute to the public treasury instead of to the purse of resource owners.

Tax exemptions may benefit.

Tax exemptions are at times very effective in conservation control. Immature and growing timber, land undergoing reclamation and reforestation, and mineral areas under development, if temporarily released from the pressure of taxation, may be more prudently developed or more easily financed and, in the long run, render a larger net social product.

The "resource" tax.

The "resource" tax will do much to correct, in after years, the earlier mistakes of improper and inadequate classification of natural resources at the time of their passage into private ownership. Many "agricultural" lands, for example, are greatly esteemed by their appropriators for the undeveloped minerals or water-power resources which they are known to contain. Such "potential" resources form the bases of misappropriation and of speculative values; they add to the market price of the land but not to its present productivity, and they are not customarily subject to wise development or to taxation—at least, not until many years after private possession is acquired from the government. A "resource survey" of all private estates, and the laying of a reasonable tax upon all latent or unused resources thus discovered would place an effective check upon much undesirable speculation; and, in many instances would cause proprietors to release to the government the title to such *secondary resources* as are not to them a present source of income.

The resource tax is a device which requires careful handling, and, if badly administered, it will work much injustice.

We now come to the examination of conditions which may justify the return of resource properties from private

ownership to public ownership. All will agree, that when a particular use of private property is a matter of public necessity, and when the customary rights of possession, control, enjoyment, etc., which attach to private ownership are incompatible with the public use of such property, then private ownership should be displaced by public ownership. This incompatibility of public use and private ownership is the imperative justification of eminent domain and of the conversion of private property to public or government ownership.

When private property should be returned to public ownership.

Private property may be converted to public ownership either by immediate and complete transition, or by a gradual transformation of the rights of ownership which may become completely public at some indefinite future time. In either case, compensation to private proprietors is required by the Constitution of the United States which in the *Fifth Amendment* recites that *private property may not be taken for public purposes without just compensation.*

Manner of transfer.

Until recently, the customary method of converting private property to public use and ownership has been by bargaining between private owners and purchasing officials, or, in case of failure to agree upon a price in this way, by condemnation proceedings in *eminent domain*. Within the last decade, however, certain private properties have in several States been made subject to public purchase upon valuations made by administrative commissions after exhaustive examinations of the "original cost" and the "cost of reproduction" of the properties. The purchase price finally decided upon, in any case, is designated as the *fair value* and, presumably, includes no allowance for speculative or monopoly elements or factors.

Valuation by commission vs. eminent domain.

In the direct purchase of private property for public purposes, several theories are urged as to what constitutes *fair value*, and as to what methods of calculation should be used. There is much controversy, for example, between advocates of a fair value which is based upon the *bona fide investment* in the property (including all initial and subsequent capital outlays, less depreciation), and advocates of a fair value calculated upon the probable *cost of reproducing* or duplicating the properties under present conditions. Of these two methods, the former seems to find favor in the judgment of most economists and the leading administrative commissions. The latter, since it results in larger amounts, is always urged by private owners, and seems to have been somewhat favored by the courts.

Principles of fair value.

The direct purchase of such natural resources as properly come within the scope of desirable public ownership may be undertaken by either of these methods. Experience in the public utility field would seem very strongly to support the plan of commission administration in such matters, with the provision that commissions should have authority to decide both upon the "public necessity" involved and upon the "just compensation" to be paid. Furthermore, such commissions should be authorized to give greater weight to the *probable future needs of society*, in establishing the "public purpose" to be served, than customarily has been recognized by the courts in eminent domain proceedings.

The relation of future needs to "public purpose" and "fair value."

The gradual transition of property from private ownership to public ownership may be accomplished in several ways. For example, certain public utility franchises provide for the accumulation of an amortization fund out of net earnings for such a period

Public purchase by amortization.

as will bring the fund to an amount sufficient to compensate stockholders for their investment. At the end of the period the fund may be used to retire the stock leaving the property in the ownership of the municipality. In the meantime the ownership is private and the management is subject to public regulations. There is a growing opinion that the "unearned increment," or spontaneous increase in the value of real estate incorporated in public utility properties, should be considered as a *public equity* in the property rather than as an automatic and continuous accrual to private values. It is also proposed that *donations* to railways and to other public-service enterprises should be considered as public investments in the projects rather than as evidences of a sentimental regard for the donees such as usually inspires the bestowal of gifts. Again, it is suggested that, since a legal principle of long standing limits public service charges to a basis of reasonableness, earnings in excess of operating expenses, maintenance charges, and the customary percentage returns to capital are virtually extortionate. Consequently, it is reasoned that "corporate surplus" accumulated from excess earnings is properly to be considered an *equity of the public*.

Unearned increments, donations and reinvested surplus.

The summation of the above suggestions is that when private properties are dedicated to the public service and are burdened with a *public interest*, the accumulations of unearned increments, donated properties, and reinvested surplus earnings constitute a gradually increasing *public equity* in such properties. The immediate significance of this public equity is that, in case of public purchase, no compensation for these particular elements of value should be required to be paid for by the public to private owners. In short, the public may auto-

Possibility of accumulating "public equity."

matically acquire a partial and gradually increasing proprietorship in such properties. These principles of a public equity in privately owned and publicly utilized property are particularly applicable to the valuation of natural resources for public purchase in the promotion of conservation. The present water power law of Wisconsin which authorizes the possible public purchase of power plants after a period of thirty years, at prices which shall not include unearned increments, is a step toward the application of one of these principles in the interest of conservation.

The possibilities of the *amortization plan* of compensating private owners combined with the *automatic public equity* device, as a means of gradually returning socially needed natural resources to the public ownership, afford a simple and workable solution of one of the most discouraging problems which the advocates of conservation have had to face.

The question which ultimately is bound to come uppermost in the administration of conservation measures is that of finance. To what extent should the financial ability of society be taxed in order to promote the reclamation and development of natural resources and secure the protection of the public interest therein? The answer, of course, must consider both the importance of the proposed measures and the financial condition of the State or government. It is understood that matters of prime necessity both of present and future, must always be financed, even at great present sacrifice and under a severe burden of taxation; but, in times of prosperity and easy wealth accumulation, less important, more distantly future, and perhaps more expensive projects may wisely be undertaken without undue hardship through pressure of taxation.

Conservation finance.

Two considerations—importance and financial ability.

The extent to which administrative machinery essential

to the financing and promotion of conservation is already in operation is realized by few. The entire educational system of the country may become an effective conservation agency as soon as sound doctrines of national economy—including agriculture, industrial organization, business ideals and social ethics, and civic and political responsibility—are made a part of the curricula. This movement is now well under way and progressing rapidly. The growth of state and federal administrative bureaus and general welfare departments has been very marked in recent years. All of these agencies are giving attention to and spending public funds in the cause of industrial capacity and economic permanence—and this is conservation. Indeed, about the only additional administrative device for the promotion of conservation which is needed is a thoroughly scientific and non-partisan federal board with sufficient authority to correlate and censor the conservation work of bureaus and departments already in existence. And in each State there should be a similar board to correlate the economic policies of all state agencies. The collection and direct expenditure of public funds in behalf of conservation including internal improvements, reclamation, public purchase of forest and mineral lands, fisheries, etc., should be subject to the approval of these boards. All legislative measures contemplating the extension of settlement and industrial projects should have the approval of these boards, and it should be their duty to frame such legislation as becomes essential to the prudential and harmonious development of all natural resources.

Effective administrative machinery now at hand.

A federal board is needed.

The correlation of existing agencies the main essential.

In conclusion, we must again refer to the financial problems of conservation. The final essential issue to be deter-

mined in any expensive undertaking is not its desirability or value, but its cost. The cost of government is the most difficult thing to justify in the minds of people who take pride in being "practical," because the benefits of government are not measurable in dollars and cents. The investment which does not return a percentage rate in dividends does not always appeal to the practical person whose sense of values is apt to be confined to materials and cash in hand. Even individuals, however, who are without imagination and are almost devoid of the civilizing instinct of altruism, are learning from experience that *industrial opportunity*—the *chance* to make a living—is valuable and worth paying for. France, Belgium, and Germany learned years ago that public funds collected by taxation during prosperous times and expended in the construction of hard roads and canals would expand the field of *industrial opportunity* and would make it possible for their growing and closely confined populations more easily to maintain themselves. But the building of roads and canals in Europe has not made possible the earning of cash dividends on the investment; nor would this "internal development" have taken place at all had the work been delayed until the poverty of exploitation and over-population had stripped the nations of their taxable ability. It is a mistaken theory of finance which assumes that public investments should, of necessity, earn an interest rate on their cost in order to justify themselves. Indeed, none of the principles of economic theory which enter into the explanation of interest is applicable to the conditions which apply to public finance.

Relation of cost of government to industrial opportunity.

European experience.

Theory of interest does not apply to public investment.

Even a brief introduction to the science of economics develops the three principles underlying the payment of

interest upon private capital—first, that interest must be paid as a premium to stimulate voluntary saving; second, that the interest rate measures the technical superiority of present goods over future goods; third, that capital may be so employed as to reproduce itself so that the "natural increase" will provide a rate of return to the capitalist. Let us examine these principles one by one, as to their application to the accumulation and employment of public capital. The first—the necessity of the payment of interest in order that capital may be accumulated—we may dismiss at once, since the accumulation of public funds by taxation is not an act of voluntary saving and investment, but is made compulsory upon the taxpayer. Even in the case of bond issues by government, the immediate contribution to the public treasure is, of course, voluntary, but the subsequent and ultimate funding of the transaction is a matter of taxation. The fact is, that the plenary power of government to tax is as effective in stimulating the accumulation of capital by compulsory saving as is the receipt of interest by voluntary savers. It is probable that, of the amount paid in taxes annually in the United States, only a small proportion would be saved if the choice of its saving or spending were left to the decision of the taxpayers. If one doubts the efficacy of taxation as an aid to saving—private saving as well as public saving—observe the story of France since the payment of the Prussian indemnity of 1870. In saving the five billions of dollars to pay Prussia, the tax-ridden peasants of France so thoroughly acquired the habit of thrift as to enter the present war individually well-to-do and nationally rich. Literally, France was taxed into thrift and national wealth in a very few years.

Three principles of interest.

Taxation may accumulate new capital.

Taxation may induce thrift.

The second principle underlying the theory of interest—that a rate of return must be paid on capital in order to offset the "technical superiority" of present goods over future goods—is mainly, if not entirely, a consideration which is confined to the sphere of purely private economics.

The personal risk of futurity does not apply to society.

This is a psychical principle which springs from the subconsciousness of individuals because of their uncertainty of the future. If the uncertainties of to-morrow and the risks of the future were entirely removed, would present goods in excess of immediate needs have a preference over future goods, even in the minds of individuals? We are inclined to believe that they would not. The future of societies and nations is not bounded by three score and ten years; and, granting an existing condition of plenty and comfort, provision for the future becomes as important—perhaps should be more important—in the national thought and the public policy than are additional present blessings.

No technical superiority of present social goods over future social goods.

Thus we see that social savings may be free from the risk of those eventualities which cause individuals to discount the future; and, this being the case, public investments essential to the conservation and development of natural resources may fall quite outside of any economic rule of necessary interest payment or dividend return upon capital as a discount against the future.

Public investments need not pay dividends.

The third principle of the theory of interest—the productivity of capital—may also prove irrelevant when applied to public funds and their investment. Individuals may subsist upon wealth, but the welfare of nations is rooted in social freedom, economic opportunity, and industrial capacity. These essentials of

Welfare vs. wealth in national economy.

national life may be assured, in part at least, by the wise public policy of investing a part of the present social surplus as a security against future social needs. But these essentials of national welfare cannot be evaluated in terms of money and paid over as earned interest on the investment. The laying of taxes and the investing of resulting public capital in the prevention of exploitation and in the development of natural resources by reclamation, reforestation, drainage, and road building are no more to be considered from the "business" or capitalistic point of view than is the expenditure of a nation's treasure in the waging of a war of defense. The *defense of national borders* and the *protection of the basic sources of national subsistence* may be equally necessary in securing to future generations their right to survive—in this right, the *chance to live* and the *chance to make a living* are quite analogous.

The "business" view becomes inadequate in national defense and economic protection of the future.

When a nation is in funds, when its people are prosperous and its industries are producing a surplus, taxes properly placed are easily borne and may be made to contribute the necessary sums for such investments as will insure the perpetuity of economic power and national prosperity. Such funds may thus be secured without the payment of interest, indeed, without any considerable encroachment upon the voluntary savings and investments of individuals. It is probable, as we have seen, that money paid in taxes, if not thus exacted for public purposes, would be spent in the annual personal budget for comforts and luxuries. Conservation finance may therefore become a measure of wholesome coercion to personal thrift as well as to national saving and investing.

The financial basis of economic power and national prosperity.

In this aspect of public finance, the main obstacles which so obviously prevent the effective functioning of private

initiative and private capital, in carrying conservation projects to conclusive measures, are entirely swept away. It becomes plain that it is the duty of a good government to consider the needs of the future in their relation to the industrial resources which are the patrimony of the present and the future alike. It is also the function of such a government, when the existing well-being of society permits, so to finance (without the calculation of an interest charge) the protection, development, and maintenance of its economic resources as to perfect and sustain their highest net productivity.

Application of principles of public finance removes chief obstacles to conservation.

The final canon of any adequate and comprehensive conservation policy is—*The nation's future may not properly be discounted to present worth and private gain; and, conversely, expenditures in behalf of the protection of the basic resources of society must be made by government free from any limitations which might be deduced from the capitalistic doctrines of interest and dividends which prevail within the sphere of private and personal finance.*

The final canon of conservation.

PART III

CONSERVATION OF CERTAIN MINERAL RESOURCES [1]

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[1] This discussion was written before the United States had entered the Great War and before certain war problems relating to mineral resources had become acute. To some extent these special problems have been discussed, but if the article were to be rewritten in the light of present conditions there might be some change in perspective and emphasis. It is believed, however, that the principles developed are broad enough in their scope to cover even war conditions, and that some of the special problems of the immediate present may well be considered in connection with the broader aspects of the question here treated.

CHAPTER I

INTRODUCTORY STATEMENT

Basis and Nature of the Demand for Conservation of Mineral Resources

The movement for conservation of mineral resources in the United States has been based: (1) On the recognition of the fact that the reserves of the mineral products are not unlimited, and that the constantly increasing drafts on these reserves will exhaust them within a period comparatively short as compared with the future of the race. (2) On the belief that the mineral resources are being wastefully mined and used, and that by changes in method of extraction or use, brought about by education or by application of public power, a larger proportion of the mineral resources may be saved for the future than under present methods. It is usually assumed that these changes will require sacrifice of private interests for the benefit of the public, and more or less sacrifice of present welfare for the future. Professor Gray [1] finds "the real heart of the conservation problem in this battle between the present and the future." This assumption has naturally led to the belief that conservation measures may be made really effective only by the application of government power. It is argued that there is a sharp limit to the sacrifice which individuals can be reasonably asked to make, and that as a

Nature of the demand for conservation.

[1] Gray, L. C., "Economic Possibilities of Conservation": *Quart. Jour. of Economics*, May, 1913, p. 499.

general principle the burden of the sacrifice that conservation inevitably demands should be socially diffused and borne by the State as a whole.

The conservation movement thus far in this country has largely sprung from the field of natural sciences. Engineers, geologists, agriculturists, and others have been the active agents in this movement. In Europe the formulation of conservation plans has been much more largely in the hands of economists than in this country, but recently American economists have been taking a larger part in the discussion of this question and are making important contributions toward the intelligent formulation of conservation policies. The essentially new features they have brought into the discussion are the clearer recognition of the necessity for determining the proper balance in conservational practice between public and private interests and between the present and the future, the use of the interest rate as a means of determining this balance, and the consideration of human energy as one of the resources to be conserved.

The economist's part in the conservation movement.

Scope of the Present Discussion

In the course of professional study of problems of economic geology, the writer has found it necessary to consider the question of conservation of certain mineral resources. The problem has presented itself more especially in relation to specific methods of conservation which have been introduced or proposed, but the attempt to form an intelligent opinion as to the desirability or necessity of such methods has led naturally to the consideration of certain general principles of conservation. It is proposed here to consider some aspects of conservation which have arisen from this study.

Present discussion to be confined to coal, iron and copper as illustrative of mineral resources.

In order to make the discussion more definite and concrete, it will be confined to three of the important mineral products,—coal, iron, and copper,—but it is believed that the conclusions reached may have some application to a wider field of mineral resources.

In reviewing specific conservation measures which have been introduced or proposed for coal, iron, and copper, the writer finds wide application of effective conservational practices which have been introduced or considered by individuals for self-interest, and, which, therefore, do not require application of government power. In fact, evidence will be presented to show that most of the effective conservation measures yet introduced have been for the benefit of private ownership, and yet involve no essential conflict between private and public welfare, or between present and future welfare. Attempt will be made to discriminate and outline the field in which conservational practice may be left mainly to private interests and the field in which the application of government power seems desirable. A clearer recognition of these two spheres of conservational activity may be helpful in eliminating confusion of thought and action, arising from the assumption that any effective conservational measures must necessarily require sacrifice of the individual for the sake of the public, or sacrifice of the present for the future, and therefore must necessarily be a matter of government action.

Conservation measures based on self-interest.

It will be of interest also to review the salient features relating to the extent and life of the reserves of coal, iron, and copper. Such considerations must necessarily influence our judgment of the desirability of specific conservational measures.

People financially interested in the mineral industries

in the United States have, for the most part, taken kindly to the general idea of conservation and many of them have become its firm advocates—in fact the development of the industries from the business standpoint alone has required some consideration of these problems—but in attempting to apply conservation principles to specific problems they have been confronted with many difficulties, arising from doubt as to how far, if at all, it is wise to sacrifice private interest to the public or present interest to the future. There has been much groping for light on the subject and unfortunate controversy has developed between extreme advocates of conservation on one hand, demanding immediate changes in the interests of the public or posterity, without much regard to their effect on private interests or present general welfare, and men in control of mineral resources on the other, to whom the immediate consequences are more apparent. There are far-sighted and public-spirited mining men who favor the general idea of conservation and are ready to take steps in that direction when it becomes clear what is desirable in the interests of general welfare, but who in attempting to apply principles of conservation to their own particular fields have become confused with the multiplicity of factors to be considered and have waited for development of a programme based on more comprehensive knowledge of these factors.

Possibility of important conservation practice within the field of private ownership should be more clear.

CHAPTER II

CONSERVATION OF COAL

Reserves of Coal in the United States

Reserves of coal in the United States were estimated in 1909 by Messrs. M. R. Campbell and E. W. Parker,[1] of the U. S. Geological Survey, for the National Conservation Commission. The total estimate of available coal (at the close of the year 1907) was 1,382,780,000,000 tons.

In estimating coal reserves of the United States for the International Geological Congress in 1913 Campbell [2] increased his figure to 3,225,294,300,000 tons.

In 1916, another revision of estimates by Campbell,[3] in a paper on Coal Fields of the United States, places the reserve, to a depth of 3,000 feet in beds 14 inches or over, at 3,538,554,000,000 tons. In addition, he estimates a reserve of coal between 3,000 and 6,000 feet from the surface of 666,600,000,000 tons.

[1] Campbell, M. R., and Parker, E. W., "Coal Fields of the United States." Rept. of the National Conservation Commission, Senate Document No. 676, 60th Congress, 2d session, Govt. Printing Office, Washington, vol. 3, 1909, pp. 426–445.

[2] Campbell, M. R., "The Coal Reserves of the United States: The Coal Resources of the World," International Geological Congress, Canada, 1913, vol. 2, pp. 538–539.

[3] Campbell, M. R., "The Coal Fields of the United States": Prof. Paper 100A, U. S. Geol. Survey, 1917, p. 24.

Quoting from Campbell's [1] last paper:

Revision of coal estimates largely increases reserves.

"Most of the estimates so far made have been based on present mining conditions and practices, and hence they do not necessarily represent the tonnage that may be regarded as available 10 or even 5 years hence.

"Although the relative size of the contents of the coal fields may be a matter of some surprise, the really staggering fact presented in the table is the immense, really inconceivable total quantity of the coal. If all the unmined coal within 3,000 feet of the surface, or 3,538,554,000,000 short tons, could be placed in one great cubical pile as solid as it now lies in the ground the pile would be 18 miles long, 18 miles wide and 18 miles high. Similarly, if all the coal that has been mined in the United States, plus about 50 per cent for waste, a total of 15,083,100,000 short tons, were similarly piled, the pile would be 1,540 feet long, 1,540 feet wide, and 1,540 feet high; or, in other words, only about 0.4 per cent of the original amount has been mined or wasted in mining."

Estimates by districts show:

"that the great bulk of the coal in this country is low-rank bituminous, lignite, and subbituminous, named in the order of their abundance, and that the high-rank coals are relatively scarce. This is an important point in conservation, as it means that our best coal will be the first to be exhausted, and that such exhaustion may occur in the not very distant future. It is also noticeable that the best steaming coal, the semibituminous, is limited practically to the two eastern provinces, and that the exhaustion of this coal will be a greater calamity to the country than the loss of all the anthracite for coal of this kind has a greater efficiency and is adapted to more diverse uses than anthracite."

With the total tonnage above given, the life of the reserves of coal of the United States would be a simple cal-

[1] Loc. cit., pp. 23 and 25.

culation if one could assume a continuance of the present annual production in the future, but the rate of production has been rapidly increasing, and will undoubtedly continue to increase. Any estimate of the acceleration of rate of production for the future is more or less conjectural. If the production were to remain the same as in 1913, the life of the total coal reserves would be 4,000 years. If the acceleration of the past few decades should be continued at the same rate and continue until the coal is exhausted, the life would be only 100 years. Campbell [1] concludes that:

Life of coal reserves.

"The true life of our coal fields probably lies between these two extremes, and the probability is that it will be nearer 100 than 4,000 years.

"Although by every reasonable estimate the ultimate exhaustion of the coal reserves of the United States appears to be an event so far in the future that it need concern this generation but slightly, the fact must be remembered that the bulk of coal being mined to-day is the best in the country and that before long, perhaps within 50 years, much of the high-rank coal will be exhausted."

If we assume, as seems reasonable, that the acceleration of the rate of production cannot continue at the same rate for a very long period, there is little probability of a shortage within the next thousand years, though the highest grade supplies will doubtless be exhausted long before this.

The urgency of demand for coal a thousand years hence will weigh heavily or lightly in the thought of the present generation, depending on individual point of view. It is difficult for some to feel keenly the problems of generations so far away, and if we do recognize

Limitation of coal reserves as a reason for conservation.

[1] Campbell, M. R., "The Coal Fields of the United States": Prof. Paper 100A, U. S. Geol. Survey, 1917, pp. 25 and 26.

the necessity of taking some steps in the interest of such far removed generations, it is not easy to formulate practicable plans to apply so far in the future. Considering the life of the race, probably the period of exhaustion is sufficiently near to constitute a valid argument against unnecessary waste. Whether the argument is sufficiently urgent to warrant such drastic elimination of waste as to require serious sacrifice of the present generation, is a more or less debatable question. It may be difficult on the basis of the above figures to arouse public interest in the future to sufficient extent to introduce drastic economies.

Measures Introduced or Proposed to Conserve Coal

The following list of measures for conservation of coal is taken from several sources. The exhaustive report of the British Coal Commission,[1] published in 1905, contains a considerable number of specific recommendations for conservation of the coal of Great Britain. The reports of the National Conservation Commission [2] of the United States, published in 1909, treat of the conservation of coal of the United States and naturally follow some of the recommendations of the British report. The coal section of the National Conservation report was prepared by M. R. Campbell and E. W. Parker of the U. S. Geological Survey and was republished as an official document of the U. S. Geological Survey in Bulletin 394. The recommendations there given are amplified and developed by Van Hise [3] in his book on Conservation, published in

Source of proposals for conservation of coal.

[1] Final Report of the Royal Commission on Coal Supplies; House of Commons, London, vol. 16, 1905.

[2] Report of the National Conservation Commission: Senate Document No. 676, 60th Congress, 2d session, Govt. Printing Office, Washington, 1909.

[3] Van Hise, C. R., *The Conservation of Natural Resources in the United States:* Macmillan Co., New York, 1910.

1910. Since that time the subject has been discussed by Smith, Chance, Burrows, Haas,[1] and others, and certain additional conservational methods proposed. A considerable number of men have also discussed the sociologic and economic aspects of the question. The report of the Conservation Commission of Canada,[2] published in 1915, treats rather fully of the conservation of mineral resources.

It will suit our purpose, and avoid some repetition, if we group all of these recommendations without regard to authorship. In general, these recommendations can be grouped under the heads: (A) Methods of mining and preparation of coal; (B) improvement of labor and living conditions at the mines; (C) introduction or modification of laws to remove certain restrictions on efficient methods of mining; (D) transportation; (E) utilization; (F) substitution of other sources of power.

Recommendations for conservation of coal.

(A) *Mining and preparation of coal.* 1. The introduction of the long wall system of mining in places where the conditions allow it, to minimize the waste.

2. Modification of the pillar and room system of mining, by which larger pillars are left while the mine advances, to be recovered in the retreat, thereby recovering a larger percentage of coal than under the old system, where small thin pillars were left, which failed and were permanently lost.

It has been argued that the great loss of coal by leaving it in pillars could be saved by using other material to support the roof, but an elementary calculation of the cost of

[1] Haas, Frank, *The Conservation of Coal through the Employment of Better Methods of Mining:* Abstract of paper presented to Pan-American Scientific Congress, Wash., Dec. 1915–Jan. 1916.

[2] Adams, Frank D., "Our Mineral Resources and the Problem of their Proper Conservation": 6th Ann. Rept., Commission of Conservation, Canada, 1915, pp. 52–69.

this shows that it is cheaper to use coal. Chance[1] says:

"The coal left as pillars to support the roof is thus utilized and performs a necessary and useful function, yet the principal part (perhaps two-thirds) of the 200,000,000 tons our friends the conservationists claim is wilfully and avoidably wasted every year is this coal that is left in pillars to support the roof. I think we can safely claim that this is not waste, but, on the contrary, is engineering efficiency of the highest type, in that it utilizes the cheapest and least valuable material available to support the roof and saves the whole labor cost of building supports of other materials. Investigation as to what becomes of that part of the 200,000,000 tons claimed as wasted, which is not utilized as pillars to support the roof, will disclose the fact that a very large portion is coal that is left in mine workings that are abandoned because the roof is unsafe and because a continuance of operation would result in injuries or loss of life. Coal left in the mines in order to conserve human lives cannot be classed as avoidable waste. A small part of the 200,000,000 tons is lost because it is intimately mixed with refuse and because the labor cost of recovering it and separating it from the refuse would be greater than its value."

3. Progress has been made in the last few years in mining shallow bituminous beds by means of the steam shovel. Valuable deposits are thus mined which can be mined by no other method.

4. New methods of filling mined-out spaces with sand, etc. New methods of mine survey and design. According to Haas:[2]

[1] Chance, H. M., Address before the mine engineering class of the Pennsylvania State College. Quoted by F. W. Gray, The Conservation of Coal: Bull. 47, Can. Min. Inst., 1916, p. 201.

[2] Loc. cit.

"the greatest advance in the question of method was the system of mine survey and design perfected in both the anthracite and bituminous fields. The relatively new method of filling old spaces with sand, etc., has also achieved success."

5. To avoid leaving coal in roof for support where the roof is weak and to avoid leaving coal of inferior quality in roof.

6. To avoid wasting thinner beds by wider use of coal cutting machines.

7. Where conditions allow it, to work upper bed before lower, in order not to destroy the upper by caving. The mining of a lower coal seam has often so broken up the overlying strata as to render it impossible to recover the upper coal seams contained therein. There are certain difficulties in the way of this conservational measure. In some localities the seams are under separate ownership, with conflict of interest. Also if the better coal seam happens to be below, with poorer seams above, market conditions may require that the lower seam be mined regardless of the destruction of the upper seams.

Conservational proposals for mining and preparation of coal.

8. To eliminate coal barriers between properties to mark limits. This involves more coöperation.

9. To improve mining machinery, power drills, etc.

10. To centralize power stations, rather than use many small units.

11. To eliminate the waste of slack or fine coal through more careful methods of mining, through limitation on the excessive use of powder, and larger use of wedges, and the abolition of laws for the payment of miners on a run-of-mine basis. It has been argued that the excessive use of powder ("shooting from the solid") means loss of coal, owing to the

fact that it breaks up the coal and makes a relatively large amount of slack accompanied with increased danger from fire and explosion and weakening of the roof. Although the excessive use of powder makes a large amount of slack, such does not necessarily result in waste, for this fine coal is carefully saved and is as valuable as the lump coal for certain purposes. So far as it endangers life it is of course objectionable.

12. It has been recommended that infirm and finely broken coal be washed and compressed to avoid waste of slack coal which was formerly thrown away and burned. However, in recent years there has been comparatively little waste of this kind for slack coal in general finds nearly as ready a market as lump coal and the use of slack is increasing. There has been much discussion of the possibilities of using the coal waste on the ground to make power for electric transmission.

13. More careful attention in sorting and sizing of all grades of coal coming from the mine, and preparation for special uses. On the other hand, some Illinois operators now practicing in that State say the ends of conservation will be best met by limiting the sorting and sizing now practiced. The large number of sizes now put on the market greatly increases the cost of production.

14. Wider use of lower grade fuels of the west, particularly with the aid of briquetting.

Methods of preparation of coal have been improved. Campbell and Parker [1] state:

Advances already made by application of above methods.

"A much greater proportion of the product hoisted is now being sent to market in merchantable con-

[1] Campbell, M. R., and Parker, E. W., "Coal Fields of the United States," Papers on the conservation of mineral resources: Bull. 394, U. S. Geol. Survey, 1909, p. 12.

dition. Part of this is due to better and more systematic methods of handling, and part to the saving of small sizes which formerly went to the culm banks. The higher prices of coal and the development of methods for using these small sizes have also made it possible, through washing processes, to rework the small coal formerly thrown on the culm banks, and these are now furnishing several millions of tons of marketable coal annually."

In general there is increase in the percentage of recovery of coal. Whereas in the past the loss in mining was said by Campbell and Parker [1] to average 50%, now an extraction of 70 to 90% may be looked for.

Quoting from Smith and Lesher: [2]

"Observation of the advances made in mining methods in the last decade or two affords slight warrant for belief in any charge of wasteful operation. As consumers of coal we might do well to imitate the economy now enforced by the producers in their engineering practice. In the Northern Anthracite field machine mining in extracting coal from 22- and 24-inch beds, and throughout the anthracite region the average recovery of coal in mining is 65%, as against 40% only twenty years ago. Nor are the bituminous operators any less progressive in their conservation of the coal they mine."

Conservational advances already made in mining and preparation of coal.

However, physical and commercial conditions do not in all cases allow of the full application of these new methods. Once a mine has been opened up on a certain plan, it is difficult to change it. As a whole the larger and better organized companies are better able to change than the smaller companies.

[1] Loc. cit., p. 12.

[2] Smith, George Otis, and Lesher, C. E., "The Cost of Coal": *Science*, vol. 44, 1916, p. 768.

Conservation measures of this class have been largely introduced by private initiative for self-interest. The co-operation of the government has been effective.

(B) *Improvement of labor and living conditions at the mines.* Under this heading should be mentioned the improvement of housing, sanitation and living conditions, improvements in efficiency of labor, introduction of safety methods, introduction of workingmen's compensation laws, etc. Much thought and discussion have been devoted to the possibilities of improvement of labor and living conditions from the standpoint of conservation of human energy. In some quarters this has been treated as independent of the physical conservation of natural resources, and it has been the tendency to assume that conservation of human energy might be more or less inimical to conservation of mineral resources. Certain of the changes already introduced have undoubtedly increased the cost of mining and, until there was general increase in selling price, this may have had the effect of eliminating certain practices of conservation of the ores which might otherwise have been possible. For instance, according to Smith and Lesher:[1]

"The increased safety in the coal mines that has come through the combined efforts of the coal companies, the state inspectors, and the Federal Bureau of Mines necessarily involves some increase in cost of operation, but the few cents per ton thus added to the cost is a small price to pay for the satisfaction of having the stain of blood removed from the coal we buy. That form of social insurance which is now enforced through the workmen's compensation laws alone adds from 2 to 5 cents a ton to the cost of coal."

[1] Loc. cit., pp. 768–769.

On the other hand, there can be no doubt that large advances have been made in welfare movements, introduced for the purpose of insuring a steadier, better and larger supply of labor, and that the general gain of efficiency of operation thereby obtained has absorbed a large part of the increased cost.

In general, conservation measures of this class have been developed coöperatively by private and public efforts without important sacrifice of private interests. There is obviously room for much wider application of such measures, especially in some of the bituminous fields where conditions are far from satisfactory.

Conservational measures yet introduced have involved little conflict of private and public interest.

(C) *Introduction or modification of laws to remove certain restrictions on efficient methods.* It has been proposed:

1. To modify laws to take care of situations where vertically superposed beds are owned by different parties, preventing the proper mining of the coal by either party.

2. To modify laws to eliminate conflict in mining practice in cases where the coal is associated with oil and gas pools.

3. To allow larger ownership by companies utilizing the coal (now only 3 per cent owned by such companies).

4. To place restrictions on over-capitalization which leads to wasteful mining in order to secure quick and large returns on large capital.

5. To remove restrictions on concentration of control. Concentration of control into comparatively few hands has undoubtedly favored conservation. It is easy to see that the stronger financial condition of the companies makes it possible for them to take fuller advantage of modern developments.

This has been especially urged for the bituminous coal industry, to avoid over-production and over-development. This means restriction of competition. The very wide distribution of the bituminous coals, their enormous quantity, their exceedingly diversified ownership, have led to over-development of coal properties. Quoting from Smith and Lesher: [1]

Over-production and over-development of coal.

"In estimating the aggregate losses incurred by society by reason of the large number of mines not working at full capacity, the facts to be considered are that the capital invested in mine equipment asks a wage based on a year of 365 days of 24 hours, while labor's year averaged last year only 230 days in the anthracite mines and 203 days in the bituminous mines, with only five to eight hours to the day."

These conditions have prevented in some cases even the most modest introduction of better methods, or changes that would enhance the average profits through a relatively short period of ten or fifteen years at the expense of the present year. It has been necessary to get at the best of the coal available in the cheapest possible way, regardless of the losses of coal left in the ground.

6. To allow coöperation in the limitation of output, avoidance of cross freights, gauging the market in advance, and division of territory, all of which would allow cheaper mining, giving larger leeway to conservational measures. This necessarily would be accompanied by government regulation, probably through the Federal Trades Commission. According to Van Hise,[2] who has been active in advocating this conservational measure, such a procedure

Permission to coöperate as an immediately effective step in conservation.

[1] Loc. cit., p. 771.

[2] Van Hise, Charles R., "Coöperation in Industry," pp. 7–8, Address given

"is neither regulated competition, nor regulated monopoly; but the retention of competition, the prohibition of monopoly, permission for coöperation and regulation of the latter. In Chicago there cannot be one selling agency for the different coal companies which operate in Illinois, but there must be many selling agencies, and the coal of Pittsburgh must come into Illinois and the Illinois coal go toward Pittsburgh; every one of which things makes unnecessary costs, but all of which are inevitable under the extreme competitive system. Because of these facts it is necessary to waste the coal. If at the very same prices the different mines could coöperate in the limitation of the output, avoidance of cross freights, gauging the market in advance, and division of territory, they could mine their coal more cheaply, have a greater profit for themselves and conserve our resources."

Common selling agencies.

7. To reduce excessive royalties paid to fee owners. Smith and Lesher [1] have recently called attention to the relatively high resource cost in some of the fields, represented by the payment of royalties to fee owners. In case of anthracite this averages 32 to 35 cents per ton and exceptionally runs as high as a dollar per ton in certain anthracite fields. For the bituminous coal the average resource cost is probably not much over five cents a ton. They suggest the possibility of lowering this cost by governmental regulation and make an especially strong argument for not allowing the government owned coal lands to go to private ownership, which in the future, with the accumulation of interest on the investment, will feel justified in asking for a large "resource" return in the way of royalty.

Reduction of excessive royalties on coal.

before annual meeting of the National Lumber Manufacturers' Association, Chicago, Illinois, May 31, 1916.

[1] Loc. cit., p. 767.

If the resource cost could be lowered it would allow of further introduction of conservation methods by the operators without greatly increasing the cost to the public.

Increase in price of coal as a conservation measure.

8. To require or allow by government regulation a raise in price of coal to the consumer, thereby allowing wider application of conservation practices. Some of the increased recoveries of coal above noted have been made possible only by increase in market price. If coöperation were permitted in the manner described in paragraph (6), the same results could be accomplished without increasing price. Present high prices caused by the war situation are reflected in the introduction of many changes which were not before possible. However, in some cases the demand for quick results under present conditions has an opposite effect, because of the desire to realize quick profits regardless of conservation.

Export tax on coal.

9. The local conservation of coal at the expense of heavier drafts on coal of other parts of the world, by imposition of export tax and preferential duties, has been discussed. While the effect of this is doubtless conservational from the standpoint of the United States, it is doubtful if it can be so regarded from the broader standpoint of world civilization.

Government ownership of coal.

10. Government ownership has been proposed as a means of facilitating the introduction of these measures.

Little progress has been made in conservation measures involving legal enactments of the kinds above listed.

(D) *Transportation of coal.* It has been argued that conservational results would result from:

Cheaper transportation.

Larger use of waterways.

Improvement in distribution of the product by parti-

tion of market and larger use of local coals. This includes control of agencies of distribution in order to minimize excessive profits of middlemen.

Where conditions allow it, conversion of coal into power at the mine and delivery of power rather than coal to consuming centers. This type of conservation is being put into practice on a large scale above Wheeling, on the Ohio River, where there has been recently built a two hundred thousand kilowatt installation for steam generated electric power. Some of the power will be delivered to Canton, Ohio, over fifty miles away. This plant uses local coal and the cost of coal is figured at two mills per kilowatt-hour.

(E) *Utilization of coal.* Conservational proposals of this kind are:

Substitution of retort coke-ovens for beehive ovens to save not only a larger quantity of coke but valuable by-products.

Larger use of smoke consumers and mechanical stokers.

Larger use of central heating plants, with higher efficiency than many local plants.

Substitution of gas engine for steam engine, and improvement of steam engine.

Improvement in methods of smelting, leading to larger output of metal per ton of coke used.

More careful study and classification of the qualities of coals in order to avoid use of higher grade coals when inferior coals would serve the purpose.

More consumption at the collieries.

Larger use of powdered coal as fuel.

Improvement of force draft furnaces.

Larger use of gas, a by-product, and extraction of other by-products.

More efficient transformation of peat or coal into power and light.

Most of the conservation measures above proposed have already been applied with good results, and with promise of large results for the future. The stimulus has come largely from self-interest, and the net result, on the whole, has been to lower cost to producer.

(*F*) *Substitutes for coal as a source of power*

Larger use of water power.

Substitution of lower grade coals,—bituminous for anthracite, and of low grade bituminous for high grade bituminous coals. Larger use of low grade western coals.

Substitution of alcohol and natural gas, oil, oil shales, peats, etc., as a source of power.

Business conditions have limited private enterprise in this class of measures, but some progress has been made. More rapid introduction of these measures would require sacrifice of private interest, and probably may be accomplished only by application of public power.

Division of Responsibility between Government and Private Interests in the Conservation of Coal

A review of the conservational measures above listed indicates that many of them are already in operation and that the initiative for such measures has been largely supplied by private ownership endeavoring to advance its own interest. In this category are to be included most of the improvements in physical methods of mining, preparation, and utilization of coal, concentration of control into larger groups better able to introduce new methods, and the improvement of labor and living conditions, and, under present war conditions, increase in selling price, allowing for a

wider use of these measures. Another group of conservation proposals, which have not yet been put into substantial effect, are obviously beyond the power of private interest and must be introduced, if at all, by the application of government power. These include the elimination of resource and royalty costs, the control of over-capitalization, removal of restrictions on concentration of control, permission for coöperation among competitive units, regulation of selling price minimums in order to insure during peace times the use of better physical practices, and control of distribution. In short, it appears, that there are two great spheres of conservational activity, one within the field of private endeavor and the other possible only by collective action through the government. The principal advances thus far made have been in the field of private endeavor.

The delimitation of fields of public and private endeavor in the conservation of coal.

The government has aided greatly in the advancement of conservation measures arising within the field of private endeavor. One need only to refer to many governmental investigations, to the spread of information as to best methods, and to local compulsory requirement that the best practice be made uniform, thereby bringing backward interests into line.

Recognition of the fact that there is a large body of sound conservational practice in the coal industry which falls within the range of self-interest seems essential in planning further changes in the interest of conservation. Conservational measures do not all require sacrifice of the individual to the public or of the present to the future generations. An exercise of public power is not in all cases essential to the advancement of conservation. The respective limits of the field of public and private endeavor are not sharply defined and vary from place

Self-interest requires conservation of coal.

to place and time to time, depending upon local conditions and special requirements. In general, the sphere of private interest includes measures which will bring adequate commercial return. The interest rate is the limiting and controlling factor. When it is possible by improvement of methods of mining, better planning, better preparation of coal, better transportation and distribution, better utilization, to secure a larger average return on the investment, or to insure return through a longer period of years, self-interest naturally requires introduction of such methods as fast as financial conditions allow. Even some of the improvements in labor and welfare conditions have been introduced in this way with a view of securing more permanent and more efficient labor supply, and thereby aiding the enterprise from the commercial standpoint.

Interest rate as a limiting factor in conservation measures introduced for self-interest.

Within the sphere of government activity lie removal of unnecessary restrictions on private initiative and such conservation measures as will involve some sacrifice of individual returns, or, in other words, reduction of a normal interest rate. Exercise of government power may be directly helpful within the field of private endeavor without materially sacrificing private interests, but beyond this point are large possibilities of conservational activity, obviously beyond the control of private interests. The introduction of any of these changes is obviously so far reaching in effect, and requires such broad readjustments, not only within but without the mineral industry, that their necessity or desirability is not in all cases as clear as in the case of measures already introduced for private interest.

Conservation measures in the coal industry possible only by government activity.

Military considerations may accelerate application of government power.

The most obviously helpful step possible to the government in the immediate future is to permit coöperative

arrangements under private ownership, making it possible to use common selling agencies, thereby reducing the cost of selling, to divide the territory to be served, thereby avoiding excessive cross freights, to allow the output to be proportioned to the demand for certain territories, thus eliminating excessive competition and over-production, all of which could be accomplished without detriment to the public if properly regulated by the government through the Federal Trades Commission. The enormous saving possible by this means would allow of the introduction of conservational methods at the mines without raising the cost to the public.

Permission for coöperation an immediately desirable step.

War conditions may require more immediate and sweeping application of government power than above indicated. The most obvious and immediate of these requirements seems to be control of prices, but such control may not affect the problem of conservation as long as selling price is allowed to remain high enough to carry the expense of desirable conservation measures.

Where the mineral resources are already owned by the government, or can be acquired by the government, some of the troublesome factors in the problem are removed, and it is possible to work out an intelligent plan for government control without the difficulties which arise in dealing with private ownership.

As the possibilities for exercise of government power in the coal industry are common to many of the mineral resources, the further discussion of this subject is left to a later chapter, after certain features of the conservation of iron and copper have been presented.

CHAPTER III

CONSERVATION OF IRON ORE

Reserves of Iron Ore in the United States

The most authoritative estimates indicate available iron ore reserves in the United States ranging from 4½ to 7½ billion tons. At the rate of production of the past ten years, this would mean a life ranging from 85 to 150 years. Assuming a rate of increase in production similar to that of the last decade over the previous decade, the life of the iron ores would range only from 25 to 33 years. Such an increase for the future will probably not be maintained.

In addition to the known available reserves, there are potential reserves, variously estimated, but approximating in the best estimates some fifteen times the available reserves. Even this figure fails to take into account the possibilities in the way of further discoveries of iron ore, even in the best explored districts, like the Lake Superior region. The writer's judgment is that as much iron ore of present commercial grade may be found in the Lake Superior region in the future as has been found in the past. For instance, in relation to the iron ores of Michigan, the writer has concluded [1] that

Large potential reserves of iron ore.

"the probabilities of extension in every district but the Menominee are so strong that it is safe to estimate that for

[1] Leith, C. K., "Iron Ore Reserves of Michigan in 1911": Mineral Resources of United States for 1911, U. S. Geol. Survey, pt. 1, 1912, pp. 177–178.

many years the ratio of reserve to total shipment will be maintained—in other words, that as much ore will be discovered yearly as is mined yearly. In fact, to-day the reserve probably bears a larger ratio to the total shipment than at any time in the past, and the possibilities of developing more ore are so great that 10 years from now there will probably be greater reserve in proportion to shipment than now. The increasing tendency of the larger interests to make sure their ore supply for years in advance is leading to the development of increasingly large reserves in proportion to past shipment. Enough facts might be cited in relation to individual mines, explorations, and ranges to show that this forecast of the future is not based on vague surmise. Large extensions, both vertical and areal, are inevitable. Probably not more than 10 per cent of the area of the Upper Huronian slates of the Crystal Falls, Menominee, Iron River, and adjacent areas has been explored. Iron formation lenses are likely to be found almost anywhere in these slates. The heavy drift covering will make their discovery a slow and costly process.

"The conclusion therefore is that at no time in the past has the outlook for long life for Michigan iron ores been any better assured than it is now. There are few regions in which expenditures of money for large explorations can yield more certain results. The future size of the reserve will be in more or less direct ratio to the money expended in exploration. There is yet no indication of diminishing returns from exploration. In fact, increased knowledge of the geologic conditions is bringing more certain results for a given expenditure of money. The reserve will cease to grow only when difficulties of exploration or outside economic influences begin to limit the amount of exploration."

Use of low-grade ores will indefinitely increase reserves.

If we were to include in our estimate for the United States the low-grade ores not now commercially available, the known facts allow of an almost indefinite expansion of estimate. In fact, if it ever becomes necessary to use ores of as low average grade as are

now being mined in Germany and England, it is safe to put the life of the reserves of the United States at many hundreds of years. While it will doubtless cost more to use these low-grade reserves, this will be offset to some extent by improvement in practices in extraction.

From a somewhat wide familiarity with the iron ores of the United States, the writer's judgment is that the United States is not likely to feel any shortage of iron ore for two hundred years or more. There will be geographic changes in the production, shifts to different and lower grades, requiring changes in methods of extraction and smelting, but these will come gradually without any marked disturbance of the industry.

Life of iron ore reserves 200 years or more.

If these figures approximate the true situation, it throws the period of shortage of iron ore in the United States so far into the future that it is difficult to make a convincing argument for present important sacrifice. We may gauge the requirements of the distant future only vaguely, and are not in a position to formulate precise plans of conservation to go much beyond those already inaugurated or proposed for more immediate interest.

Limitation of iron ore reserves as an argument for conservation.

The writer has reached a similar conclusion for the iron ore reserves of the world.[1]

Conservation Measures which have been Proposed or Introduced for the Conservation of Iron Ore

The following illustrative examples are taken mainly from the Lake Superior region which produces about four-fifths of the iron ore of the United States.

[1] Leith, C. K., "Iron Ore Reserves of the World": *The Times* (London), Engineering supplement, Feb. 4, 1914, p. 31.

Improvement in percentage of extraction in mining. The last few years have seen rapid and important changes in methods of mining in order to lower cost and to secure a larger percentage of extraction of the ore, leaving less waste in the ground. Comparatively few years ago in the Lake Superior country, 25 per cent to 30 per cent loss of ore in extraction was not unusual. Now in most of the larger underground mines 90 per cent extraction is ordinarily secured and even this figure is bettered in some instances. Where conditions allow open-pit methods these are being rapidly introduced, resulting in nearly 100 per cent extraction. Every possible effort is being made to increase the percentage of extraction to the utmost limit allowed by competitive commercial conditions and by considerations of safety. Up to this point the total profit is increased by decreasing the loss of ore.

In some of the iron districts the nature of the ownership is a powerful influence in requiring the highest possible degree of extraction. The mining companies largely hold their ores under lease. It is to the interest of the owners to see that all the marketable ore possible is taken out under the lease and if the mining company overlooks any method or process which would tend toward a larger extraction of ore, it may be required under terms of its lease to introduce such methods.

Fee owners require clean mining of iron ores.

On the other hand, excessive royalties required by certain fee owners tend to lower the percentage of extraction because the operator can then afford to handle only the highest grade ores.

Conservation of low grade ores. In nearly all Lake Superior mines there are widely varying quantities of lower grade ores closely associated with marketable ore. In fact, in most mines a complete gradation may be found between the

ores above 50 per cent in iron, and wall rocks containing 25 per cent of iron. For the most part, ore running less than 50 per cent is not salable, but in certain special cases favored by transportation, by quality of the ore, by market connections, grades as low as 38 per cent are mined and sold.

Much is being done toward saving these lower grade ores by mixing them wherever possible with higher grade ores in order to secure the lowest average grade which the market can absorb. Where a comparatively few years ago it was customary to take out the higher grade ores at a higher immediate profit, thereby resulting in the continuous lowering of the percentage of iron in the reserve, now the operator figures very carefully how the higher grade ores can be made to carry the maximum number of tons of low-grade ore and still compete in the market.

Mixing of low grade with high-grade iron ores.

As the grade of ore taken by the market from the Lake Superior region in recent years has steadily fallen at the rate of about $^1/_3$ of 1 per cent of iron contents a year, it is reasonable to suppose that some of the grades not now marketable may be sold in the future. Much study has been made of the possibilities of conserving this ore and definite steps have been taken in this direction, in the way of stockpiling it separately where it is necessary to move it, or leaving it in the mine in such condition that it may be moved later. Most mine operators are daily confronted with the problem as to how far to go in attempting to save these lower grade ores. If it could be done without cost, these ores would all be saved as a matter of course, even though there were only a remote possibility that they might be used. But such saving adds to present cost and naturally the mine operator wishes to limit the cost to an amount, which, with interest, will not

Saving low-grade iron ores by stockpiling.

exceed the probable receipts from this ore in the future. Until there is government intervention, and it may be some time before there is sufficient knowledge of the requirements of the situation to warrant this, it may be expected that expenditure for the conservation of these lower grade ores will be limited, for the individual is not likely to spend money which will not be returned in a reasonable time with a normal rate of interest. The use of the interest rate as a measure of desirability of conservation measures is illustrated in a later section of this paper (pp. 233–238).

Division of control between fee owner and operator as a factor in the conservation of low-grade iron ores.

The question of the conservation of low-grade ores is complicated by the dual nature of the control of these ores. It is to the interest of fee owner to require the conservation of low-grade ores to the fullest possible extent allowed by the financial condition of the operation, even though there is no reasonable probability of using such ore for many generations in the future. The operator, on the other hand, is interested in conserving only such ores as might be used during the period of his lease, which, in the Lake Superior region, usually runs from thirty to fifty years. The fee owner brings constant pressure on the operator to conserve low-grade ore, though he is not always willing to lower his royalties to make this easier for the operator. The general effect is beneficial to conservation, but in individual instances the fee owner's requirements for conservation may be so burdensome to the operator and require expenditure so far in excess of the probable return in the future that true conservation is hindered rather than promoted.

For instance, certain recent leases on the Cuyuna iron range of Minnesota, where the present lowest marketable grade runs about 50 per cent in iron, require that all ore running as low as 35 per cent be separately stockpiled or

so left in the mine that it can be used. This adds cost to the present operation, to meet which, under prevailing market conditions, means that only the higher grades can now be profitably mined, instead of a mixture of higher and lower grades. If the lessee were required to conserve ore running 45 per cent and above in iron, there might be a possibility of its use within a short enough period of years to warrant the present increased expenditure. By requiring conservation of 35 per cent ore an average low-grade ore is accumulated in which the higher and lower grades are so mixed that they can never be separated. In view of the enormous tonnages of high-grade ore available, these accumulations will remain unmarketable for so long that the initial expenditure, with interest, will be out of all proportion to the probable future returns on this ore. In other words, the requirement of conserving ore goes so far as actually to prevent rather than help conservation of a product that could be used in the future.

Illustration of conflict between fee owners and operators in conservation of low-grade iron ores.

Introduction of processes of beneficiation for low-grade ores. Some of the Lake Superior iron ores below present commercial grade may be concentrated into salable ore by mechanical processes. Where the texture permits, as in parts of the western Mesabi district, all that is needed is the washing out of silica, occurring in a loose granular form in the ore. In other cases the silica may be washed out after the ore has been crushed. Where the ore is magnetic, the ore may be crushed and the iron mineral separated with a magnet from the accompanying gangue of quartz. The first of these processes is already in successful practice in the Lake Superior region, but much attention and experimentation are being devoted to magnetic processes, with promising results.

A recent and highly promising development is the successful roasting of iron carbonate ores northeast of Lake Superior. The grade is raised from 40% to 50% in iron. The product is a highly desirable one containing exceptionally low phosphorus. This process makes available many tens of millions of tons heretofore regarded as useless.

Successful application of concentrating processes means the present use of low-grade ores, thereby lessening the draft on the higher grade supplies. Its effect is conservational.

The extent to which these practices may be developed is limited strictly by cost, under the present competitive system of ore sales. It is physically possible to produce large amounts of ore in these ways, but it remains to be seen how widely this can be done at sufficiently low cost to allow the concentrated products to compete in the market with the higher grade ores not requiring concentration. Some investigators of the subject believe that there may be developments in this direction comparable to the recent great developments in concentration of low-grade copper ores. The situation is different in certain respects, in that iron is a metal of much lower unit value and the reserves of present commercial grade are so large and widely distributed as to control the market for a long period to come. The hope of future large scale use of concentrating processes rests largely on the assumption that the supply of high-grade ores is limited. While the known supply of present commercial grade in the Lake Superior region is limited, there are still large opportunities for finding further high-grade ores to prolong this life. Also the existence of huge reserves of ore in other parts of the world will tend to keep ore prices down to a point which is likely to limit the expenditures in concentrating iron ore.

Limited application of processes of beneficiation of low-grade iron ores.

Exercise of government power or even international power will be needed to eliminate the competition of the higher grade ores with these concentrated products, and, in view of the vast quantities of the higher grade ores available, this would be a highly artificial condition which probably will not be considered seriously for a long time to come.

The writer's judgment is that concentrating processes will be introduced on a larger scale than at present, but that the total product thus saved will be a relatively small part of the total production of ores. The most promising outlook for concentrating processes seems to be in their supplementary use in the mining of the higher grade ores. In many mines there are low-grade ores which need to be moved in order to get out the high-grade ores, or which can be moved during the mining of the high grade ores at a minimum expense. The beneficiation of such ores by concentration may in such cases be accomplished with a minimum expense and tend toward the conservation of the ore body as a whole. Even though the concentrated product were sold at cost, it may help to divide overhead charges on the mining operation.

In this line of conservational endeavor the self-interest of the owners and operators is in the direction of bringing about conservation, and the movement will go to the fullest extent allowed by competition with higher grade ores.

Conservational effect of concentration of ownership in larger units. Since the opening of the Lake Superior region there has been a more or less continuous tendency toward the concentration of control of iron mines, with the result to-day that the great bulk of Lake Superior reserves and mining operations is controlled by perhaps a half dozen strong

companies.[1] Whatever the economic or political consequences of this tendency may be, there can be no doubt about its beneficial effect on the conservation of ores.

The keen competition of many small mining companies, relatively weak financially, did not permit of the comprehensive large-scale planning of operations for a long series of years, which is now the rule. In order to exist it was necessary to get out the highest grade ores at the lowest possible immediate cost, regardless of the effect of such a method on the reserves in the mine. In good times the mines were operated; in bad times many of them were closed. With the concentration of control in comparatively few hands, operation became more uniform. Instead of planning operations in order to yield a large profit for the immediate present, it became possible to plan them for an average profit through a long period of years, in some cases the life of the lease,—thirty to fifty years. The mining equipment is built on a more permanent basis. The mine is opened up more systematically for the future. The nature and extent of the ore body are more carefully determined. Study is made of the possibilities of mixing the high grade with the lower grade ores, thereby insuring a larger product and extending the life of the mine. Where, for instance, under old conditions a high grade supply sufficient for several years could be seen, this was ordinarily taken out, leaving to the future the problem of handling the lower grade ores. Now the lower grade ore is carefully figured and a method of mining adapted to securing, by judicious mixture, the largest

Kinds of conservational practice possible to large companies.

[1] Van Hise, C. R., *Concentration and Control:* Macmillan Co., New York, revised ed., 1915, p. 129.

Mussey, H. R., *Combination in the Mining Industry*—a study of concentration in Lake Superior iron ore production: Studies in History, Economics and Public Law, Columbia University, vol. 23, No. 3, 1905.

tonnage which the market allows. Not only is this done for individual mines but the common ownership of considerable groups of mines makes it possible to mix ores from several mines, thereby insuring a steady production for some of the lower grade properties, which would otherwise be eliminated entirely by competition. For instance, the United States Steel Corporation must obviously plan its operations for a considerable period of years, for its ore reserves as a whole, with careful attention to the conservation of reserves for the future. To sacrifice the interests of the next decade for the sake of higher profits in the present decade, would be regarded as poor business.

The steadying influence of more concentrated control on production has also favored labor and the community welfare in a manner described on a subsequent page.

What has been said about concentration of control in the Lake Superior region applies almost to an equal extent in the other iron fields of the United States. Yet nowhere has the concentration of control gone far enough to acquire monopoly. Not only is there keen competition, but in the Lake Superior region and in many of the other iron-bearing regions, it would be possible to accumulate reserves of ore sufficient to start another steel corporation by combination of smaller units. Specific evidence as to the ownership, control and reserves of ores which have been accumulated seems to the writer to disprove any charge of approach to monopoly.[1]

Monopoly not yet reached in iron industry.

Conservation of labor and social welfare. One of the conspicuous tendencies of recent years has been the careful

[1] United States of America *vs.* U. S. Steel Corporation and others, District Court of the U. S. for the district of N. J., Transcript of record, vols. 16 and 17, 1913.

Eckel, E. C., *Iron Ores*, New York, 1914, pp. 339 et seq.

study of labor and community welfare conditions, in the attempt to make conditions sufficiently favorable to maintain permanent supplies of high class labor. Concentration of control has aided this movement. During times of depression the larger corporations are able to keep the mines operating more steadily than before, using men in exploration and development for better times to follow. Many of the larger companies now have departments devoted especially to the study of social and general welfare conditions, with the idea of making permanent, prosperous communities, and thereby assuring continuous efficient labor necessary from a business standpoint. Formerly this was not possible to anything like the present extent, because the smaller companies then more common were not large enough to be capable of any general survey or control of the situation.

While wages in this field, as elsewhere, are largely limited by competitive conditions, there has been for a series of years a distinct effort to bring the wages to such a level as to make the work attractive to a better and more permanent class of labor.

Living conditions have been carefully studied and in most of the mining camps have shown great improvement. The fact that most of the residential locations for the miners about the mines of Lake Superior are controlled by the mining companies makes it possible to exercise a beneficent control. No attempt is made to make a profit on houses built at company expense. In fact in most cases the return is not more than 2 or 3 per cent. The loss is offset by the influence of proper housing conditions in securing and holding a responsible labor supply. Sanitation is carefully looked after, the care of yards and gardens is encouraged by offering prizes. Even such minor items

as the painting and general attractiveness of buildings and locations are carefully considered. Community education and entertainment are encouraged. In a large number of the mine "locations" club houses have been built as community centers. Hospital and medical attendance have been made more adequate, in many of the camps visiting nurses being maintained. The best of schools are provided and encouraged.

Welfare movements prompted by self-interest.

The fact that all of these movements are regarded as good business, aiding in the acquirement and maintenance of a high class labor supply, does not make them any less desirable or less helpful in the conservation of labor. While the main reason for such movements is self-interest, it should not be assumed that this is the only one, for, in fact, many of the operators are public spirited men, who take a large interest in welfare work for its own sake. There are a number of conspicuous instances in the Lake Superior region where the movement has been carried considerably beyond the immediate requirements of self-interest.

Likewise the "safety first" campaigns have produced notable results. Most of the companies are thoroughly organized in this regard and have developed a keen spirit of competition among employés in the attempt to lessen the number of accidents. Reports are published weekly and monthly, and prizes given for the best results. This also is a conservational movement, prompted primarily by self-interest, although not entirely so.

Important government aid in welfare movements.

Governmental agencies are doing much to help in this movement in the way of education and legislation. Legislation is tending to fix certain practices which have proved to be desirable, and thereby insure their more uniform use,—compensation acts, mine in-

spection, rules as to underground operation and construction, are all evidences of beneficient governmental aid and control. The point to be emphasized here is that there is no fundamental antagonism between the public welfare and the interests of the mine operators, that the initial and most immediately effective moves in this direction have been prompted by self-interest, and that they are not on that account any less desirable in their effect on the general welfare.

Improvement of efficiency. We need only mention the word efficiency to bring to mind the rather strenuous efforts on the part of mining companies in this field. Improvement of efficiency in organization, cost accounting, equipment, and labor, usually favors the introduction of methods to save raw materials, and where wisely planned, of the improvement of conditions of labor.

Conservational effect of changes in utilization and distribution of products. Metallurgical practice has rapidly developed in the attempt to meet the ever changing and increasingly complex demands for finished products. These have made available large classes of ore which were formerly not available and in part wasted. The rapid growth of the open hearth process of steel making has required the use of large quantities of high phosphorous ore, which otherwise would not be available. Better knowledge of metallurgy has made it possible to use a wider variety of mixtures to secure desired results, by insuring the more intelligent use of the raw materials. By-products of the blast furnace are now recovered in sufficient quantity to make available certain grades of ore not formerly of value. Such developments are likely to increase in the future. In this connection should be mentioned the production of cement as a by-product of iron manu-

Saving of by-products in iron smelting.

facture, the recovery of potash from both the blast furnace and the cement kiln, the use of certain low-grade iron ore on account of the content of certain minerals, such as manganese and chromium, and the use of charcoal and coal by-products lowering the cost of smelting of iron.

Measures for the Conservation of Iron Ore, not yet Inaugurated by Private Interests, but Possible for the Government

The measures thus far sketched are in more or less successful operation, though not yet as widely in use as is desirable. They have arisen mainly from the field of private endeavor, although the government has contributed important aid in the way of investigation, education, and cooperation, and the compulsory requirement of certain good practices. A number of other conservational measures have been proposed, which have not as yet been tried in this country, and which are obviously beyond the field of private endeavor. Some of these measures are as follows:

Elimination of resource cost. It has been suggested that if the royalty rates could be reduced or eliminated larger conservational activities would be permitted.

Restriction on over-capitalization, elimination of wasteful competition, and over-development, modification of laws permitting the larger concentration of control in a few hands. The conservational effects of such measures are obvious, but equally obvious are the far reaching consequences of any decisive moves in this direction.

If laws could be modified to allow mining companies to coöperate in the limitation of output, division of territory, avoidance of cross freight, gauging the market in advance, and the use of common selling agencies, all under close government supervision, there are possibilities of lowering cost, with consequent

An immediately practicable step in conservation.

wider opportunities to introduce conservational methods. This measure seems to be one which is immediately practicable under the Federal Trades Commission by a comparatively slight modification of laws.

Compulsory requirement of certain practices of mining or utilization. The government, for instance, might require that all ore, in a given district, as low as a certain percentage in iron should be concentrated or beneficiated, thereby raising the price to the consumer, or, it might require that certain specific methods of mining should be followed, the effect on price being the same.

Arbitrary increase of prices to the consumer. If the price could be raised to the consumer, a wider range of conservational activity would be permitted. It may be assumed that owners and operators of iron mines ask as high prices for the iron as competitive conditions will allow, and therefore any further raise in price would have to be accomplished by governmental intervention. Under such conditions as the present, prices are doubtless high enough to allow of desirable conservational practices, but under peace conditions there is opportunity for governmental regulation to establish minimum prices to insure continuance of conservational practice.

Government ownership. It has been argued that government ownership of the ores would lead to application of wiser methods of extraction and eliminate excessive profits to individuals; that the government would be able to do better than private interests in developing the kinds of conservational activities already under way; that under government ownership such methods of operation could be introduced as would seem most desirable from the standpoint of physical conservation, regardless of how these measures affected price.

Military considerations. Where necessary for military purposes, probably all would concede the desirability for a wider application of government power than under normal conditions. Such action may effect conservation by requiring the use of certain ores or practices necessary for the purposes of the moment.

Conclusion. The above possibilities for wider application of government power are discussed in a later chapter. The purpose here is merely to emphasize the fact that for iron ores there are two main fields of conservational activities, one private and the other public.

CHAPTER IV

CONSERVATION OF COPPER

Reserves of Copper Ore in the United States

The situation as to copper reserves of the United States was summarized by the Director of the U. S. Geological Survey in 1915, in the following words:[1]

"Seven years ago Prof. Lindgren, in discussing the visible reserves of copper ore in the United States, itemized the estimates for four districts in three States, for which he obtained a total of about 160 million tons of developed reserves, and his comment[2] was: "Each year will, however, surely find extensions of reserves added to those already discovered." Now, indeed, these four districts have known ore reserves amounting to over 600 million tons, not to mention 60 million tons already mined, mostly in these few years. Nor is this gratifying increase due alone to the exploratory work of the mining engineer. Since 1906 the average recovery from United States copper ores has decreased from 50 pounds of metal per ton to 32 pounds.[3] This change in quality of ores mined and treated is due more to the improvement of methods

Increase of copper reserves

[1] Smith, George Otis, "The Public Interest in Mineral Resources": Abstract, Mineral Resources of the United States for 1915, U. S. Geol. Survey, Pt. 1, 1915, p. 8a.

[2] Lindgren, Waldemar, "Resources of the United States in Gold, Silver, Copper, Lead and Zinc": U. S. Geol. Survey, Bull. 394, 1909, p. 142.

[3] Butler, B. S., *U. S. Geol. Survey Mineral Resources*, 1914, pt. 1, p. 555, 1915.

than to the exhaustion of the richer deposits. The continued lowering of the cost of mining and treating a ton of ore has made possible this reduction in the grade of ore that can be profitably handled, and the result is a corresponding increase in the copper ore reserves of the country."

Emmons [1] in 1916 estimated a 40 to 100 year supply, at the present rate of consumption, in the districts now exploited in the western hemisphere, and thinks it is not too optimistic to expect that reserves in new districts will be discovered in the future equal to those that are now known. He states:

"The Western Hemisphere supplies about 72 per cent of the world's copper. In the districts now exploited the ore bodies that are blocked out and those reasonably certain to be developed will probably supply copper at the present rate of consumption for about 40 years. With moderate success in prospecting contiguous territory these districts may reasonably be expected to produce copper at near the present rate for perhaps 100 years, if the price advances materially. The outcrops or surface exposures of copper deposits are readily leached by ground water and frequently they contain little or no copper. Thus the presence of copper deposits is not so obvious to the explorer or prospector as the presence of gold, iron, and other metals that dissolve less rapidly in ground water and therefore commonly accumulate at the surface. Prospecting for copper, consequently, is expensive, since it may necessitate sinking of test shafts or drill holes in search of deposits. Because there is so much promising territory that has not been gone over we may expect important discoveries of copper ore in districts that are not now known to contain copper

[1] Emmons, W. H., "Conservation of Copper," Abstract of paper presented to Pan-American Scientific Congress, Washington, Dec. 1915–Jan. 1916.

deposits of value. Perhaps it is not too optimistic to expect that reserves in new districts will be discovered in the future equal to those that are now known, if we include with new districts those partially prospected and known to contain some copper and those that now are worked for other metals."

Mainly due to increasing efficiency of methods of mining and concentration, it is now possible to use such low-grade copper ores as to enlarge the reserve to a remarkable extent. No one can predict the limits of this extension.

Methods of Conservation of Copper Ores

Emmons [1] summarizes as follows the steps that are being taken to conserve copper ores:

"Within the past 15 years rapid progress has been made in prospecting, in mining, and in milling copper ores. Our practice is so much better than it was that we are justified in expecting much of the future. Improved systems of mining large ore bodies, particularly the introduction of 'top-slicing' and 'shrinkage-stope' methods, have resulted in greater safety for men employed and in lower costs for recovery. At present the loss in milling leaves much to be desired, but rapid improvement is being made. The development of the oil flotation and kindred methods for the treatment of slimes is working a revolution in ore dressing that means prolonging the life of ore reserves immensely. The acid leaching process for siliceous sulphide ores and the alkali leaching process for ores in carbonate gangue are no longer in the experimental stages."

Among other conservational activities may be mentioned the concentration of control in strong companies, leading to larger scale mining operations, with larger output and re-

[1] Loc. cit.

duced cost per unit, the growing emphasis on efficiency in all departments of the operation, the conservation of labor by better wage scales, improvement of living conditions, safety campaigns, compensation acts, improved methods of concentration and smelting, in fact most of the kinds of practices already mentioned in connection with coal and iron. Perhaps the most conspicuous of the conservational measures has been the wide introduction of the oil flotation process of recovering copper from the finely ground ores. This has increased the percentage of recovery, and has made available many low-grade ores and tailings otherwise of no value.

Conservational practices made possible by concentration of control in copper industry.

The development of the above conservational practices has made it possible to use the low-grade copper deposits, such as the "porphyry group," enormously enlarging the copper resources and lessening the drafts on the higher grade ores. The reserves of these low-grade ores are extensive, and increasing efficiency of operation is making it possible to handle lower and lower grades.

Of especial interest is the greatly improved metallurgical practice which makes it possible to recover copper in tailings and slags from earlier operations. In some cases this copper can be recovered at a less cost than from the mines in the same districts. In some districts, notably Lake Superior and Butte, the metallurgical improvements in the past few years have added to the reserves of copper in the old tailings an amount of copper not far short of the amount that has been taken from the mines during the same time. Practically all of the slags of the earlier operations of Bisbee are being retreated.

Improvements of metallurgical practice.

The recovery of by-products has also had an influence in extending ore reserves. A notable case is the recovery of sulphuric acid in the Ducktown district, which has added

so greatly to the value of the ore that material very low in copper can be profitably treated.

The recovery of arsenic, zinc in bag house dust, and other by-products, is certain to be increasingly important factors in the industry. In this connection it might be pointed out that the efforts of the farmers to compel the smelters to suppress the smelter fumes nuisance has not been without beneficial results to the smelters themselves.

Another conservational measure is the recovery of old metal. In some resources there is, of course, no recovery once they have been used. In copper, on the other hand, the present recovery of old metal is a very considerable part of the domestic consumption and exceeds the production of any district in the country.

Conservational practices of the kinds above listed have been initiated mainly by private interest in the attempt to increase personal profit for the present and future. Government and State, through various agencies, particularly the United States Geological Survey, Bureau of Mines, and State bureaus, have coöperated effectively in these advances. In addition, certain practices mainly relating to safety and compensation, have been made compulsory by legal enactment.

Without going into further detail, a mere recital of these facts seems to show that in such efforts there is no essential conflict between public and private interest, that they are not only conserving present interests, but those of the future, that they are the first and most obvious steps to be taken in conservation of copper ore, that it is inevitable that such important conservation measures as these, appealing both to public and private interests, present and future, should be pushed to the utmost as a preliminary step to

No conflict between public and private interest in conservational measures for copper of type already introduced.

any serious attempt to superpose on the industry practices devised for the interest of future generations, requiring real sacrifice of the present.

Other Conservational Measures for Copper Ores, Possible Only by Application of Public Power

It is clearly possible for the government, as in the case of the coal and iron industries, to accomplish additional results by guaranteeing minimum prices of copper, by requiring the uniform introduction of certain methods, eliminating resource cost, by government ownership, removal of restrictions on combination, and permission to coöperate under regulation. Military requirements may hasten certain of these steps. These possibilities are discussed in a later chapter.

CHAPTER V

DIVISION OF RESPONSIBILITY BETWEEN PRIVATE AND GOVERNMENT OWNERSHIP IN CONSERVATION OF MINERAL RESOURCES

Existence of Private and Public Fields of Activity

The foregoing summaries of measures introduced or proposed for the conservation of three of the principal mineral resources are designed mainly to bring out the fact that the more important advances in conservation yet made have been accomplished mainly by private interest, working for its own benefit, though with important aid and coöperation from the government, but that in addition to these conservational activities, there are other important proposals in the interest of conservation which are beyond the sphere of private enterprise and which can be introduced only by the application of government power, often requiring sacrifice of private to public interest or sacrifice of the present to the future. This discussion will have accomplished its purpose if it has made clear the existence of these two fields. All conservational measures do not necessarily require sacrifice, and all private endeavor is not necessarily antagonistic to public or future welfare. It is indeed a fortunate condition that such an effective influence of self-interest can be brought to the aid of the conservational movement.

All conservational measures do not necessarily require individual sacrifice.

It is not meant to imply that private interest has done

all that can be done, but that it has initiated the most important conservational measures yet started. So much attention has been focused on the things not yet done, that unfortunate instances might be cited of failure of the public to realize how much is already started in the direction of practical conservation by private interests. In fact the prevailing assumption seems to be that effective conservation measures must necessarily require sacrifices of private interest. While this is undoubtedly true in individual instances, it seems to the writer that much the greater part of conservational activities, already initiated for the benefit of the present generation of operators, are not in essential conflict with either present or future general welfare, but, on the contrary are working toward public welfare, and are the first and most practicable steps to be taken in any general plan of conservation. They are effectively meeting the conservationists' demand that waste of raw materials be minimized. They are the kind of steps which have been and are likely to be first enacted into law for the sake of securing uniformity of practice and bringing backward interests into line. From this point of view much more can be accomplished of known immediate value by coöperation and aid of government with private agencies. This point of view is admirably expressed by the Director of the U. S. Geological Survey in the following words:[1]

"Equally important, if not indeed altogether imperative at this time, is the need that the public support only such proposed legislation as may promise to encourage engineering efficiency in the mining industry. The public interest

[1] Smith, George Otis, "The Public Interest in Mineral Resources": Mineral Resources of the United States for 1915, U. S. Geol. Survey, Pt. 1, 1915, p. 8a.

requires that the idea of the Government as a trustee be kept in mind, yet it is no less essential that the trustee fully appreciate just to what extent individual initiative and especially corporate effort are attaining some of the very ideals desired in the public interest. By its constructive effort the large unit in production —'big business,' if you please—is winning such victories in the largest and wisest use of our mineral resources that its public-service nature is becoming apparent. Public regulation of private operation is the people's safeguard, but regulation need not be active as long as these great industrial units are seeking larger profits not by artificially curtailing production or raising prices but rather by eliminating waste and lowering costs. The larger dividends paid by mining companies to-day are won not so much through monopolistic control of virgin bonanzas as through the possession of tracts of mineral land big enough to warrant great expenditures of engineering skill. It is the day of large returns from lean ores. The net result of this type of exploitation is to increase rather than to decrease the Nation's resources. Even concerning an expendable resource it is in a sense true that 'There is that scattereth and yet increaseth.'"

Public service nature of big business.

Interest Rate as a Limiting Factor in Conservation by Private Interests

In the private conservational efforts above sketched the interest rate plays an important part. Money is not expended for betterments leading to conservation unless the return of this money, with interest, can be foreseen in the future. Where it becomes necessary to introduce conservation measures which will cost, with interest, more than the probable return that can be estimated for the

future, this will hardly be done without the exercise of government power. It is argued that a burden of this kind ought to be socially diffused. From this point of view, the interest rate marks the line beyond which the argument is strong for governmental control.

Also within the field where government control is necessary the interest rate furnishes a basis for estimating the amount of sacrifice involved in any compulsory measure and thereby for determining the desirability of requiring it. If, for instance, the public becomes convinced, because of shortage of reserves, or for other reasons, that compulsory conservation must be introduced in certain fields at a higher cost than will be returned at a reasonable rate of interest in the future, this excess of cost is a definite measure of sacrifice of the present for the future.

Illustrative example of application of interest rate to conservation problems. To illustrate the application of interest rate to conservation problems we may cite the question of conserving low-grade iron ores of Lake Superior. While private owners apply the interest rate rigidly to most lines of improvement, some of them fail to carry it over to certain questions of this kind.

The interest problem stated.

It may be assumed that the private owner will not conserve low-grade ore when the present cost of conservation (by stockpiling or otherwise), when compounded at 6 per cent interest for the number of years which would elapse before this ore is used, will exceed the profit above current cost of extraction which the ore will yield when it is used. The problem he is immediately interested in is to arrive at some basis for forecasting the probable course of prices and demand for iron ore in the future as a basis against which to figure his present expenditure. Shall he save grades running as low

as 45 per cent in iron, or shall the lower limit be 40 per cent, or even 35 per cent? The variety of practice in this regard, thus far inaugurated, indicates that there is more or less guess work in some of the decisions which have been reached. In fact, in some cases, little attempt is made to reason out the possibilities in any detail, the attitude being that the present cost of saving the ore is small and that it *might* be worth something in the future.

The writer has elsewhere [1] outlined a possible working basis for estimating future profits on low-grade iron ores, which indicates a rather narrow range for present expenditure which may reasonably be expected to be returned with compound interest in the future.

"The present cost can be easily determined. Both the time at which an ore will be used and the future profit above mining costs are matters of speculation, but I believe it is possible to set certain limits for them.

"*Future profits.* Just as ores now show the widest variety of availability, depending on chemical and mineralogical composition, texture, geologic and geographic position, cost of mining, etc., so the ores of lower grade which will be used in the future will show like variation in availability. The only factor common to all ores which can be used to summarize and compare the different ores is profit per ton. Profit determines whether a given ore can now be used and will determine this in the future. If, therefore, we can approximate the profit per ton above current cost of mining for any given ore, at any given time in the future, we can easily calculate how much, if anything, one can afford to spend now to save this ore. This profit can never be accurately predicted in advance, but I believe it may have much the same relation to profits on higher grade ores as it has at present. If a 50 per cent ore now shows a mining

[1] Leith, C. K., "Notes on the Conservation of Lake Superior Iron Ores": *Trans. Am. Inst. Min. Engrs.*, vol. 50, 1915, pp. 231–235.

profit of $1.50 per ton, the lower grades as calculated from price tables will show profits of a fraction of this amount, ranging down to zero. In certain favored Lake Superior localities 38 to 40 per cent low-phosphorus, high-silica ore can be mined now at a profit of 25 cents or less. In less favored localities, where now only the higher grade ores are being mined, the time will come when the lower grade ores will necessarily be mined, but when this time arrives, the profit per ton will probably be at least as low as the present profit for such low-grade ores mined from the most favored localities and as low as the price we now figure from penalties, for the tonnage of the lower grade ore available is so vast and so widely distributed that its extraction will be necessarily accomplished on a small margin of profit, like a manufacturing enterprise, such as, for instance, the utilization of clay and cement materials. The total cost to the consumer may be the same, but relatively more of the cost will go to fuel and to handling the larger quantities of material necessary to produce a given unit of finished product.

"More specifically, I cannot see that there is any basis for hope that 40 per cent Mesabi ores will be mined at any more profit per ton than the Marquette low-grade ores. When these 40 per cent Mesabi ores come to be mined they will be in competition with enormous quantities of 40 per cent ores elsewhere, and they will be mined at a very low margin.

"*Time.* For any given iron ore district, the rate of exhaustion of the higher grade reserves may be roughly figured and the time estimated in which the successively lower grades are likely to come into use. For instance, the average percentage of iron in the Lake Superior ores has been showing during the past decade a drop of about a third of 1 per cent per year. With a present average of about 49 per cent natural, at the present rate of decrease of grade a 45 per cent ore would come to be used in about 12 years. This time, of course, would not be uniform for all districts. Certain ores will be used long before others. This is a minimum time, because we must remember that as the grade

falls the tonnage of available ores is enormously larger, which will slow up the rate of the decrease of grade. Also it is to be remembered that really only a small portion of Lake Superior is thoroughly explored. I suspect that, outside of the Mesabi, for a hundred years to come high-grade reserves will be added to more or less in proportion to the expenditure made in exploration. Finally, there is the probability of effective competition of foreign ores. I should say, roughly, that in any given district, one would need to be optimistic to predict large use of an average grade 5 per cent lower than the present prevailing grade in a period shorter than 30 years.

"*Conclusion.* With these facts in mind, let us assume that it costs now 25 cents per ton to conserve an ore which is 5 points lower than the present commercial grade. Let us also take an optimistic view of the situation and say that this lower grade when mined is going to yield a profit of 50 cents a ton, which is perhaps as good as anything that could be figured out from the present profits on such ores, or from the calculation of penalties. It is apparent from a compound interest table that such an ore must be used in 12 years unless there is to be a loss on the money invested in conserving the ore. If, on the other hand, it costs only 10 cents per ton to conserve this ore, and the profit is assumed to be 50 cents per ton in the future, it would be possible to hold the ore 28 years. If the profit per ton is assumed to be 25 cents and the present cost of conserving it is 5 cents, it is possible to hold it for 28 years.

"Without going into further illustrations, and without arguing for any specific figures of time and profit, it seems to me clear that there is a narrow limit to the sums which it is wise to spend to conserve low-grade ores. It is my opinion that 25 cents per ton profit at a period over 30 years away may be the condition of mining the greater part of the ores 5 points lower than the present standard for any locality. It is apparent that it would pay to spend a very few cents a ton to conserve these ores. If this is true, the present value per ton in the ground of such low-grade ores is practically negligible.

"In the above discussion royalty is included as a profit. The payment of royalty to the fee owner by the lease holder amounts to a division of profit. The profit of either party would, therefore, be lower than the figures I have given. It follows that royalties on low-grade ore will need to be pretty low."

The above remarks refer principally to the direct use of raw ores. So far as beneficiation may come into use it will make low-grade ores more immediately available, increase their value and therefore warrant a slightly larger expenditure for conservation, but after deducting interest, depreciation and profit for the beneficiating plants themselves, there will probably be such small profit on the low-grade ores as not seriously to modify the above principles.

CHAPTER VI

CONSERVATIONAL MEASURES REQUIRING APPLICATION OF PUBLIC POWER

Outline

The government has afforded important aid to conservational measures initiated by private interests and as a matter of course the continuance of governmental influence in this field will mean the widening of its range of present activities, both in the way of education and in regulation and control. More measures will be enacted into law, tending to put into general practice the best results of private practice. In the future, as in the past, effective laws will arise out of the field of actual experience. These should tend toward equalizing and standardizing conditions in the mineral industry, and should make for general welfare, which includes, in large measure, the advancement of self-interest of private owners, as a whole, although undoubtedly requiring individual sacrifice.

Among these immediately desirable activities of a co-operative nature are broad study and correlation of mining practice, utilization of ores, means of promoting safety, betterment of living conditions, efficiency methods, etc. Through application of public power the advanced practice of the few may earlier become the practice of the many. Mining men are eager to take advantage of better methods as soon as they are pointed out to them. Individually they are not able to study the situation as broadly as govern-

ment agencies. Of the same general category are the activities of the scientific and technical societies and the schools in studying problems and disseminating information. There seems to be an almost unlimited field for advance in this direction.

Beyond the coöperative activities above sketched, without actually acquiring ownership, it has been proposed that the government may introduce certain additional conservational measures within the field of private ownership without lowering the returns of a normal interest rate to a point which would be confiscatory. Some of these are: (1) The compulsory application of certain good methods of mining and use of the mineral resources, resulting in a saving of the ore, but involving a higher cost to the public, or even a limitation of use by the public. The same result might be accomplished by establishing a minimum price for the mineral product or the limitation of its use, thereby allowing introduction of expensive conservation measures. (2) The modification of laws allowing a wider concentration of control, and elimination of wasteful competition and over-development. (3) To permit coöperation among the smaller competitive units under regulation by the Federal Trades Commission. (4) Limitation on over-capitalization. (5) Elimination of excess profits as measured by normal interest rates for money invested in a hazardous enterprise such as mining. (6) Avoidance of excessive taxation of mineral reserves. (7) Control of distributing agencies.

List of possible activities of government in conservation.

It may be assumed that as long as the resources remain in private ownership, the government may apply such measures only to the point which will leave a fair earning capacity to the owner, in other words, it may not introduce changes which will lower earnings below a point yielding

a fair interest rate. Otherwise it is difficult to see what inducement will keep private enterprise in the field. To go further than this means confiscation or government ownership.

Under government ownership still further conservational practices are possible. In this field the interest rate need not so rigidly control or limit conservational practice. Also taxes are not figured as an important item of cost. Where the government owns the lands, or acquires ownership by purchase or other means, it is argued that it could accomplish more effectively some of the conservational practices already inaugurated by private interest and more easily introduce some of the more radical applications of government power, like those listed in the preceding paragraphs. Perhaps the most important measure possible under government ownership, not covered in the foregoing category, is the elimination or reduction of resource cost, or the royalties on ore paid by operators to the owners of the land.

The mere listing of possible governmental activities should make it clear that much less actually has been accomplished than in the field of private endeavor. The question of the introduction of these practices therefore mainly relates to the future.

Conservation Measures Possible to the Government Without Acquiring Ownership

1. *Compulsory application of certain good methods of mining and use of mineral resources, involving higher cost to the public.* The activity of the government in this field has thus far been mainly confined to compulsory application of measures tending to promote conservation of labor. In this category are the various regulations relating to

safety, mine inspection, workingmen's compensation, etc. To a large extent private and public interest have been in accord in these activities and much has been accomplished by coöperation and education without material sacrifice of private interests, but to some extent also this has required in some cases important individual sacrifice, and undoubtedly there are opportunities to carry these activities much further by requiring more sacrifice. It seems inevitable and desirable that continued public interest in these problems should require a wider application of compulsory measures.

It is possible also for the government to require uniform application of certain methods of mining, preparation, and use of mineral resources, as yet in operation under only the most favorable combination of circumstances. For instance, it might require the wider use of the long wall method of mining coal and certain new processes of preparation and sizing of coal, beneficiation of iron and copper ores, etc.

Local conditions are often such that the introduction of these methods can be accomplished only by elimination of profits or by raising the price to the consumer. For instance, the low-grade magnetite ores of the Adirondacks and the low-grade "sandy" hematites of the western Mesabi are favorably situated geographically with reference to transportation and consuming centers and are of a nature susceptible to cheap beneficiation processes, but to require the application of similar processes to iron ores less fortunately situated, or of a slightly different character, would mean operation at a loss or higher price to the public. If the measures were required at a loss, private enterprise would soon drop out of the field and the continuance of the enterprise would require government ownership.

Uniform application of government power not feasible.

The alternative course, that by government regulation the price be raised to the consumer to allow these practices, presents a problem exceedingly difficult to solve in a definite and satisfactory fashion. One of the difficulties relates to the keen competition in most of these industries. To raise the price locally would invite offerings of raw materials from other parts of the world. To meet these offerings, high tariffs would be necessary. If the situation were met in this way, manufacturers dependent on adequate supplies of these resources would be at a price disadvantage with reference to competitors from other parts of the world. If, in some fashion, this factor of competition from other countries could be controlled, there would still be the question as to how far it is wise to limit and penalize the demands of modern life for raw materials to be used as a basis for its material development. It is ordinarily assumed that the growing demand for steel, coal and copper is a legitimate one and that to meet it means material advancement of civilization. The increase in per capita consumption of coal, iron and copper is often cited as a measure of the material advancement of nations. At what point therefore should this demand be curbed by increase of price in order to save raw materials for the future? The limitation of supplies, as will be indicated in subsequent pages, does not yet seem to present a decisive argument for immediate drastic change. The argument is yet convincing only to the point of requiring elimination of unnecessary waste, not the limitation of legitimate demands.

Possibility of increasing price to allow conservation is limited.

In general, therefore, it seems that the application of government power to require conservation methods of the kind considered in this section has rather severe limitations which will prevent essentially new departures in this direc-

tion. There will continue to be minor and slow changes of the kinds already inaugurated, but, to introduce some of the more drastic changes which have been proposed will mean elimination of private enterprise, or the higher price to the public, involving such widespread changes in the very basic conditions of demand and use of essential raw materials as to require more convincing arguments than those yet presented.

2. *Modification of laws allowing wider concentration of control of mineral industries.*[1] Whatever the economic advantages or disadvantages of the growth of large corporations and the concentration of control in the few hands, there can be no doubt that they have resulted in large material savings in raw materials through broader application of certain conservation measures, devised to insure the larger returns of capital through a longer period of years. Where smaller companies have found it necessary to follow a "hand to mouth" procedure from year to year, and have often lacked sufficient capital to introduce certain modifications in practice in order to gain an ultimate saving and prolong the life of the operation, the larger and stronger companies have found it advisable, necessary, and possible to introduce these changes. Without the growth of strong financial combinations, many of the above cited conservational advances in the coal, iron, and copper industries would not have been possible. The low-grade porphyry coppers would not to-day be supplying a large portion of the copper supplies; the low grades of iron ore would not be beneficiated and mixed with higher grade supplies; the long wall method of coal mining, and advances in methods of coal preparation involving more expensive plant, would not

[1] Van Hise, C. R., *Concentration and Control:* Macmillan Co., New York, revised ed., 1915.

have been introduced. Overhead charges have been cut down; a large amount of wasteful competition and over-development has been eliminated.

If the conservational results of concentration of control have been definite in the past, there is good reason for the belief that further concentration of control would accomplish further material conservational results in the future. For instance, in the bituminous coal fields, the ownership is so diversified that there is most wasteful competition and over-development. There is such keen competition among many companies that even the most elementary advances in the way of conservation are in many cases not possible. Mines are developed far ahead of immediate requirements, involving the carrying of heavy interest burdens and multiplication of overhead charges.

Possibilities of conservation through concentration of control.

On the other side of the question is the fact that a certain amount of competition serves as a spur to the discovery and application of more efficient methods, and if concentration of control is allowed to go to the extent of acquiring practically a monopoly, it becomes possible, though it is not clear that this is the usual result, to load the industry with excessive private profits at the expense of the public and offer less incentive to efficiency. At this point more drastic government regulation of prices and methods may become necessary, and to this extent the argument for government ownership perhaps becomes strong. Neither in the iron, copper, or coal industries has the approach to monopoly yet reached the point of eliminating stimulating competition, and the tendencies for concentration of control are working strongly in the direction of conservation,—even in the anthracite fields where progress toward monopoly has been

More government supervision needed where concentration of control approaches monopoly.

more marked and consequently the question of governmental control is more acute.

From the standpoint of conservation alone, it seems clear to the writer that, at least to the point where monopoly begins, the removal of restrictions on the natural tendencies toward combination can scarcely fail for some time to come to have a conservational tendency in regard to raw materials for most of the mineral resources.

(3) *Permission to coöperate under government regulation.* Perhaps even more favorable to conservation of natural resources than actual combination into large business units would be permission to coöperate under government regulation by the Federal Trades Commission. Under the strictly competitive conditions required by present laws it is illegal for companies to combine to use common selling agencies. The result of the duplication of selling agencies is enormous increase of cost, which tends to prevent introduction of conservational methods. An illustration of this has already been quoted in relation to the sale of coal in Chicago, p. 201. Under present laws it is illegal for competing companies to get together for the purpose of proportioning the field to be served by the different companies, with the result that natural resources from different territories are miscellaneously redistributed through territory which could be more economically served by local resources. The enormous increase in the freight bill from this cause is obvious. This arrangement also makes it impossible to figure in advance with any certainty on the output. Where possible for a localized industry to serve a limited territory under government regulation, it should be practicable to plan operations in advance and often greatly to restrict output. Under present competitive arrangements and overlapping of

An immediate and practicable step in conservation.

territory served, competition often requires vast overproduction. Permission for coöperation would allow of many other economies not possible under the present laws relating to competition.

The Chamber of Commerce of the United States of America [1] after a nation-wide referendum recommended "that there should be remedial legislation to permit coöperative agreements under federal supervision in those industries which involve primary natural resources, on condition that the agreements in fact tend to conserve the resources, to lessen accidents, and to promote the public interest."

Van Hise [2] has proposed an even broader principle, namely:

"The restraint of trade or commerce meant by this section is that restraint of trade which is detrimental to the public welfare; and the presumption is that any restraint of trade is thus detrimental."

Substantially this principle has already been adopted in Australia. In England it was decided in the Salt case "that whether a corporation, which is in fact a monopoly, should be dissolved or not, is dependent upon whether or not that monopoly is a benefit to the public, and it was found that the salt monopoly is a benefit to the public, and it was found that the salt monopoly of England had been charging reasonable prices; that the prices had been stable; that in consequence of it the people had been benefited, and the high court of England refused to dissolve that corporation." [3]

[1] Chamber of Commerce of the United States of America, Referendum 17, 1916.

[2] Van Hise, Charles R., "Coöperation in Industry," p. 11, Address given before annual meeting of the National Lumber Manufacturers' Association, Chicago, Illinois, May 31, 1916.

[3] Van Hise, Charles R., Loc. cit., p. 11.

(4) *Limitation on over-capitalization.* One of the deterrent factors in conservation has been over-capitalization of companies exploiting natural resources, burdening the industry with excessive interest charges, requiring wasteful exploitation to meet these charges, and preventing introduction of conservation methods. Adams [1] concludes that this is one of the most important difficulties confronting the introduction of good conservation measures in mining the coal of Canada. Many investigators have reached a similar conclusion for the United States. The problem of over-capitalization of mining companies is not materially different from the problem in many other fields of industry. Some progress has been made toward correcting this evil through State and national legislation. The wider application of restrictive measures of the kind already initiated would seem on the whole beneficial to conservation.

"Blue sky" legislation.

In this connection should be mentioned also the "blue sky" legislation, designed to limit the financing of worthless mining enterprises at the expense of the public. There is a lure about mining investments which is capitalized by promoters to the large loss of investors. This reacts unfavorably on legitimate mining, in that it tends to exaggerate in the public mind the hazards of legitimate mining, making it possible to secure money for such developments only at high interest rates. These high interest rates constitute a burden to the industry which prevents the introduction of certain conservation measures possible with cheaper money.

(5) *Elimination of excess profits as measured by normal*

[1] Adams, Frank D., "Our Mineral Resources and the Problem of Their Proper Conservation": 6th Ann. Rept., Commission of Conservation, Canada, 1915, p. 55.

interest rates. There is rather a widespread belief that private ownership of mineral resources means grossly inflated private profits, constituting a tax on the industry, and therefore inimical to proper conservational measures. The conspicuous instances of acquirement of enormous wealth in the exploitation of mineral resources are regarded as proof that excessive profit is characteristic of the mining industry as a whole. The high average interest rates paid to banks for the use of money in mining enterprises is likewise regarded as evidence of excessive profits.

When the mining industry is considered as a unit, it seems to the writer that there is some fallacy in these arguments. The average return is probably not larger than in most industries if the cases of conspicuously profitable enterprises are averaged with the much larger number of failures. Specific calculation of the money and energy expended in some of the most successful and best known mining districts has shown that the excess of profits over total expenditure, in other words, the "social surplus," for the camps as units has not been large, and in many cases there is none at all, even though a few individuals may have profited hugely. The average return on iron and copper ores is probably a little above the normal interest rate. During the last six years the Michigan State Tax Commission has attempted to evaluate the iron and copper mines on a 100% basis. A comparison of the total valuations of the iron mines of Michigan and the total earnings shows that the aggregate earnings for the five years ending 1916, represented about 5½% return on the aggregate appraised capital and that out of this return there are still depreciation and other charges to come. In other words, the Michigan iron industry as a whole, which is perhaps typical of the entire

Average mining profits not excessive.

Lake Superior region, is operated on a very low average return, though in certain years and for individual companies, the return may be very much higher.

In the bituminous coal field the return is often below the normal interest rate. In the anthracite field it may be larger than the average interest rate, though as to this the writer has no specific knowledge.

It is clear, therefore, that the compulsory and uniform application to the mineral industries of measures tending to lower average profits must have deterrent results on private initiative in the discovery and development of mineral resources, in that many operations earning a normal or subnormal return, or operations working on the barest margin of return will be eliminated. This would mean limitation of mining activities to the more favorably situated enterprises, and correspondingly greater drafts on these fields. This tendency might, or might not, be conservational in its effect. It seems difficult to prove it affirmatively, and until it is so proved, it is unlikely that such measures will be introduced.

Uniform reduction of profits by governmental intervention works hardship on marginal enterprises.

The only way to deal effectively with the problem of excess profits seems to be in the use of certain gradational measures, designed to lower the profit of the more favorably situated enterprises, without eliminating the so-called "marginal" enterprises,—such measures for instance, as gradational taxes, or the compulsory introduction of better mining methods, or use of lower grade ores for the enterprises best able to stand the increased cost. If higher taxes on the companies with largest earning powers mean lower taxes on the marginal enterprises, the result may be conservational in allowing the weaker enterprises more leeway

Introduction of gradational measures to avoid the elimination of marginal enterprises.

in introducing better methods. While the formulation of such gradational measures to reduce excess profits will be difficult and will involve most careful studies of values and earnings, there seems to be opportunity here for the intelligent application of government power in the interest of conservation. This means, in short, that in applying government power to the introduction of conservation measures of almost any sort, intelligent discrimination between the widely varying natural conditions of mining companies should add greatly to the effectiveness of such measures. For instance, conservation measures may be beneficially introduced in certain strongly organized fields, such, for instance, as the anthracite fields, whereas the application of the same measures to the same extent in some of the bituminous fields might be confiscatory.

6. *Avoidance of excessive taxation of mineral resources.* The net result of taxation of mineral resources is (1) to raise the price to the public, (2) or to cut excessive profits, (3) or to require lower costs of mining. As already indicated (pp. 242–244) there are some severe limitations on the first two possibilities, though clearly some of the tax is offset in this way, especially where a gradational tax is used to eliminate excess profits of more favored enterprises. To meet the tax the third method, to lower cost of mining or extraction, must be mainly relied upon. So far as possible this is done by increasing efficiency of methods, without loss to conservation, and if coöperation were permissible, the saving would largely offset the tax, but beyond a certain point it becomes no longer possible to meet the tax in this way, and certain conservational practices are abandoned. For instance, by increasing efficiency it has been possible to use or to set aside for the future larger quantities of low-

Increased taxation may be partly met by lower cost of mining, by increasing price to the public, and by limitation of excessive profits.

grade iron ores, without increasing cost to the consumer, or lowering already slender profits. Large increases in taxes have in some cases required the abandonment of operations based on low-grade supplies, or methods used to save low-grade parts of ore bodies of good average grade. To exist it has been necessary to take only the higher grade ores. At this point taxation becomes directly inimical to conservation. In some localities its adverse effect is already painfully apparent, and current tendencies further to increase taxes on natural resources, promise further curtailment or elimination of conservation measures. In fact indiscriminate taxation is perhaps the most clearly recognizable deterrent to conservation. For carefully considered gradational taxes the adverse effect is much less.

Beyond a certain point taxation inimical to conservation.

The popular argument for imposing heavy taxes on mineral resources is plausible enough. Nature has made mineral resources for public use, and once gone, nature does not work fast enough to replace them within the life of the race. Having fallen into private ownership, through the accident of faulty laws, the public is entitled to demand partnership in division of profits. Fundamental to this view, is the belief that the profits for private ownership are excessive and should be reduced. There is often failure to recognize the fact that for the industries as units the profits are not excessive, though unequally distributed, that the flat lowering of profits often means the necessity of charging higher profits in order to live, which may be possible only to a limited extent, or the elimination of reasonable conservational methods. Wider recognition of the fact that beyond a certain point higher taxation, and especially taxation which does not discriminate between high and low earning powers, reacts

Reason for high taxes on mineral resources.

against conservation will be an important aid to the conservation movement. Already the tax on Michigan iron ore averages about 25 per cent of the net earnings; for certain properties the percentage has run as high as 45 per cent. This is higher than in many other lines of industry in the same region.

Tax on certain Lake Superior ores already 25% of net earnings.

One of the effects of increased taxation apparent in recent years in the Lake Superior country is a marked decrease in exploration for new ore. There is less attempt to outline reserves far in advance on which taxes must be paid for a long period before use. This procedure is tending to offset the higher taxes on ores already discovered, by limiting the total amount of ore against which the tax may be assessed. To a certain point less exploration is probably not harmful either to the public or to private owners, because reserves are still large enough to meet the demands. If continued, however, there is a possibility that it may curtail reserves to such a point that an unusual demand for ore may be met with difficulty, resulting in higher prices.

Effect of taxation on exploration.

Especially harmful to the cause of conservation are heavy ad valorem taxes or property taxes on reserves which under present market conditions can be mined only slowly or must be held for the future. Even though the ore is of satisfactory grade and cheaply mined, trade and transportation conditions often make it impossible to sell this ore fast enough to carry a heavy ad valorem tax. In many cases in the Lake Superior region it has become almost a liability to own certain reserves of ore. Recognition of this fact has in recent years led to a movement for a tax on output, a tonnage tax or income tax, the fundamental idea being that the ore should pay a tax only when it is being used. Many inequalities of taxation may thus be eliminated. However,

the absence of any ad valorem or property tax may put a premium upon the accumulation of vast reserves and their withdrawal from public use by large companies, to the detriment of the public. To meet this a moderate ad valorem or property tax should be retained. In short, the combination of the two methods of taxation by the use of both property tax and some form of income tax seems to promise the best results. This phase of the subject might be developed at length, but enough has been said to indicate the bearing of the tax question on conservation.

Tax on unexplored mineral lands, which has been introduced in certain localities of the Lake Superior region, may have an ultimate beneficial effect in reducing resource or royalty costs. Large acreages of mineral lands are held by old estates which originally acquired the lands for timber and are now selling off surface rights for farming, retaining the mineral rights. The original cost has long since been returned and it is possible to hold the mineral rights in reserve for a long period, without much cost where not taxed. The initiation of a tax on these rights may have the effect of stimulating exploration in order to see whether the mineral rights are worth holding if taxed, or it may cause the reversion of part of these rights to the State. The State may easily acquire vast mineral rights by purchase of tax titles. In the former case the effect may be in the direction of over-development, which is not conservational. In the latter case the State would be able to carry these mineral rights at low cost, because of its better credit, until such time as development is necessary, at which time they can be leased, presumably at a lower price than would be charged by private owners and the returns would come to the public. (See p. 256.)

Tax on unexplored lands as a conservational measure.

7. *Control of distributing agencies.* The effective dis-

tribution of bulk commodities like coal, iron and copper requires well-organized agencies, which require compensation. It is clearly within the field of the government to exercise sufficient control over these agencies to prevent excessive compensation to the detriment of the industry or public. At times of great demand, as at present, there are opportunities for unscrupulous distributing agencies to collect excessive tolls, in the form of high transportation rates or high commissions, which are anti-conservational in that they may prevent the mine operators from introducing conservational measures which good demand and high prices make possible. Under the Clayton act it is illegal to-day to divide market territory among producers of mineral resources. The result is an excessive freight bill due to overlapping of territory served. Likewise it is impossible to coöperate to gauge the output, or to use common selling agencies. Permission for coöperation, under government regulation, would lower cost of distribution, thereby allowing introduction of conservation methods at the mines, without raising cost to the public. In the Federal Trades Commission and the Interstate Commerce Commission the government already has agencies for the effective handling of this problem, if amendments to the Sherman and Clayton acts were to allow it.

Permission to coöperate would improve distribution.

Conservation Measures Possible through Acquirement of Ownership by the Government

Introductory. So far as the preceding argument is strong for the application of public power within the field of private ownership, it favors the proposal of government ownership as facilitating the application of these measures. With government ownership a broader survey of problems would be possible, there would be less confusion and con-

flict, there would be elimination of certain local practices inimical to conservation, there would be power to carry through changes not possible to private ownership. On the other hand, the government would necessarily follow for some time the lines already laid out by private enterprise, and there is a question whether the government can fully supply the deficiency caused by the elimination of private competition and initiative. If it were conceded that government management could be equally successful in this regard, undoubtedly the cause of conservation would be forwarded by government ownership, but if the most important and definite steps in conservation open to the government are the development of measures already initiated and well under way by private ownership, and if there is any element of doubt as to the ability of the government to do the work as well as private interest, the gain for conservation, which would be brought about by acquiring government ownership, does not seem to be sufficiently certain or large to require so drastic a step on the part of the nation. Regulated coöperation seems to promise better results.

Government ownership may facilitate conservation measures.

Conservational measures under government ownership may follow the same lines as under private ownership.

But if government ownership permits of desirable and necessary conservation measures clearly not possible to private interest, then the sooner it is acquired the better. Certain conservation measures have been proposed, possible only under government ownership, which have been regarded by some investigators as constituting stronger arguments for government ownership than those above indicated, i. e., the elimination of resource cost and the operation of the industry on a lower rate of interest. These two possibilities are considered below.

Elimination of "resource cost" as a conservation measure

possible by government acquirement of ownership. One of the strongest arguments for the acquirement by the government of privately owned mineral lands as a means of furthering conservation is that such ownership would tend to eliminate the resource cost of materials, that is, the amounts paid to the fee owners in the form of rental or royalties. If this could be eliminated there would be more leeway for increasing costs of operation, thereby allowing the introduction of further conservational methods without raising the price of the product to the public. There seems to be no way to completely eliminate this cost, for the initial cost, interest, and administration should properly be charged against the land, and collected later in form of royalty. Failure to make this charge requires that the amount be collected in taxes. However, a real decrease of resource cost is possible under government ownership because of the lower interest at which the government may carry this charge, due to better credit, and because of freedom from taxes. The State or government may be supposed to have an indefinitely long life, as compared with the individual or corporation, and may plan to carry ownership for an indefinite period at low cost. Also the mere chance of finding ore on the limited acreage, which private ownership can afford to carry, becomes almost a certainty for the larger tracts which the State could afford to carry. Private ownership must make a higher charge for the resource cost because of the greater hazard involved in smaller areas, its poorer credit, which requires a higher interest rate on its capital, and its necessity of realizing profit earlier than would be required of the State.

Better credit of government makes it possible to carry mineral resources at a lower rate of interest, and thereby lower resource cost.

It is not necessary to assume for the sake of this argument that resource cost charged by private owners is neces-

sarily excessive from their standpoint. Even a small preliminary investment, when compounded through a long period of years, with added costs of administration and taxes, may require large royalty to return the investment.

Resource cost under private ownership not necessarily excessive.

For instance, the United States Geological Survey has calculated that an investment of four or six million dollars for the purchase of Oklahoma coal lands, containing two thousand million tons, would require a final return of one hundred sixty million dollars in royalty to balance the account, during the six or seven centuries required for mining. Also it has been calculated by George H. Cushing, the Editor of *Black Diamond*, that if all of the coal in the United States east of the Rocky Mountains, amounting to about two million million tons, were to be purchased for one cent a ton in the ground, the interest charge alone would require a charge of two dollars per ton against a production of six hundred million tons a year.[1]

On the basis of figures of this kind, Smith and Lesher conclude: "The consumer of the next century simply cannot afford to have private capitalists invest to-day in coal land for their great-grandchildren to lease."

For mineral resources already owned by the government the elimination of resource cost is even more easily accomplished, as indicated on page 261.

Possibility of lowering the rate of return through acquirement of privately owned mineral resources by the government. If it be conceded that the operation of the interest rate limits the conservational activities of private owners, the question is still open whether a lower return on invested capital may not be feasible under government ownership, thereby allowing introduction of costly conservational

[1] Smith, G. O., and Lesher, C. E., Loc. cit., pp. 769–770.

methods. The answer to this question seems to be clearly indicated by the fact that the State usually has better credit than the individual or corporation, and that it may borrow money to carry natural resources at a lower rate of interest. Except in times of war the State may obtain its money for 3 or 4 per cent, while private ownership must pay 4 to 6 per cent at least, and in case of mining enterprises often a much higher rate. If it were not for this fact the cost of government ownership would be as high as for private ownership. Part of the charge might be carried in the form of taxes, but this would not change the total charge to the public. For instance, if the government purchases the mineral resources on expert valuation it will need to invest a sum equivalent to the present value of the estimated profits through the life of the property. The present value will be figured on the normal interest rate in operation in the mineral industries. The industry under governmental ownership thereafter carries this capital charge with interest. To charge against the operation a lower rate of interest than was figured by the private owner in arriving at a present value of the property, means a loss which is made up by taxes. This may or may not be desirable. The writer wishes merely to make the point that any lessening of interest rate after purchase of resources, to allow wide application of conservation measures, is simply made up in another manner, and the result is the same as if public money were appropriated directly for such measures.

Government may carry mineral resources at a lower rate of interest than is possible by private ownership.

Elimination of tax charges. Under government ownership the mineral industry would be free from taxes, an important item of cost to private owners. This would allow of the introduction of conservational measures without raising cost. There may be little net saving in taxes to the public

for the reason that amounts equivalent to the taxes paid under private ownership of mineral resources would need to be collected from other sources to pay the expenses of the government.

Conservation of minerals already owned by the government. The conservation of raw materials already owned by the government presents a slightly different problem. Here there is no question of interference with private ownership, except in so far as exploitations of these resources by the government might develop competition affecting the private interests in the same field. As a matter of fact the known supplies of iron and copper now owned by the government are probably too limited, and in case of coal to some extent too low grade, materially to affect the conditions in these industries. The government here has the widest opportunity for the introduction of conservation practice. If it decides on the immediate utilization of these materials, naturally it will follow more or less the practice which has been found desirable in private ownership. If the government decides to postpone the utilization of these materials for the future, this also is possible. Such action might or might not be conservational. Unless the government finds some way to restrict the demand, it would mean correspondingly heavier drafts on privately owned reserves, with no net gain for the future. Much good can be accomplished, as an example and corrective, by conducting the governmental enterprises efficiently and on a high plane and using the product as a way to correct any abuses of distribution which may develop. However, it is the writer's view that after the wisest course has been decided upon, it will be found to be patterned rather closely on the methods followed by private industry,

Opportunities for the government to introduce effective conservation measures for resources already under its control, thereby setting a standard for private ownership.

which have developed through a long series of years as the result of the complex interaction of a large number of powerful factors which it would be difficult for governmental agencies to ignore or override.

The most important advantages in government ownership seem to be the possibility of operating on a lower interest rate, because of better credit, elimination of taxes, reduction of excess profits, and the partial elimination of large resource costs arising from private ownership of mineral lands, that is, costs paid to landowners in nature of royalties. This should make it possible to spend relatively more on improvement and conservational methods. Having made no preliminary investment for the purchase of these resources long before they are used the government may carry the resources at small cost until such time as they are used. If, then, the government decides to lease or sell to private owners it may do so at a lower figure than would be possible had it been necessary to include in the resource cost a preliminary investment with interest, administration, and tax charges through a long series of years. A good example of the beneficient effect of government ownership is shown in its policy in recent years with reference to sale or lease of coal lands. The position is taken that leases or sales will be made to operators when they are actually ready to use the coal, and at that time they will be given control of sufficient acreage fully to protect their investment and plant, but beyond this the government has refused to go, in this way preventing private interests from tying up coal lands for the distant future and giving them the opportunity to burden the operation with heavy resource or royalty costs in order to cover capital investment, interest, administration, taxes and profit through a long period of

Leasing of government coal lands with proper conservation safeguards.

years. If this policy had been followed in earlier years large tracts of coal lands, as for instance in the anthracite field, would have been held under public control until the time came to use them, with resulting lower resource costs.

Extent of Reserves as an Argument for Wider Application of Government Power

It may be assumed that the limitation of reserves, indicated in earlier chapters, is a sufficient argument at least for the introduction of such conservation measures as have already been started, and which do not require important sacrifice of private interests. Whether the presently known facts as to reserves constitute a convincing argument for the wider application of government power, is not so clear. The answer to this question will vary widely, depending on enthusiasm for general welfare in this far distant period. Quoting from Professor Ely (page ooo of this book):

Limitation of reserves not yet sufficiently clear as a basis for wider application of government power.

"The answer depends in final analyses largely on individual and social philosophies: What is the purpose of existence—the source and nature of ethical obligation—our duties to posterity."

It is the writer's belief that where drastic measures for the future come directly in conflict with present welfare, the size of our mineral reserves is so large, and expanding so rapidly, that it may be difficult to convince the community as a whole that future needs are sufficiently clear to warrant much immediate sacrifice. But if the introduction of certain conservation measures may reasonably be postponed, there still remain wide opportunities for measures not directly inimical to present interest, and indeed even favoring it. These opportunities are of such scope and importance that they may absorb our best attention and

thought for some time to come. The formulation and application of plans within this field will lead naturally to a more intelligent conception of possibilities of more drastic application of public power in the future. In the meantime, also, our knowledge of future reserves will become more definite, and will afford a surer basis for judging the desirability or necessity for present sacrifice for the future.

Danger of Monopoly as an Argument for Wider Application of Public Power in Conservation

If it be granted that up to a certain point concentration of control favors, rather than hinders, conservation of mineral resources, there still is a question whether actual monopoly might not have a reverse effect, in that it would permit of the segregation of excessive profits at the expense of conservational measures, eliminate the spur of competition in efficiency practices, and permit of loose and inefficient methods. The mineral industries in which the approach to monopoly is the closest, yet show few ill effects of such tendencies. In fact, the largest companies have as yet been conspicuously at the front in introduction of conservational measures. In actual monopoly it is difficult to predict to what extent these practices might change, but clearly the potentialities of such a condition would probably warrant in the mind of the public a wide application of government power when this stage is reached.

As a matter of fact, a survey of the field of mineral industries discloses but little likelihood of monopoly for some time to come, with the exception of the anthracite fields. While no one company has a monopoly of that field, the reserves of anthracite coal are held by a comparatively few interests and the field is so

Monopoly not yet apparent.

remarkably limited geographically as to make it impossible to hope for the growth of strong competing interests. Most investigators agree that this is probably the first point of attack in considering the wider application of government power.

In the bituminous coal industry, the reserves are so large, so widely scattered, and of such variety of ownership, that there seems to be little fear of monopoly. In fact the industry as a whole is in such a loosely organized condition that it probably would be for the interest of the public if a much greater concentration of control were introduced.

In the iron ore industry the United States Steel Corporation has many powerful competitors. The distribution and ownership of reserves are such that it would be easily possible by combination of competing companies to assemble ample reserves for one or more corporations of the size of the Steel Corporation. The evidence presented at the trial of the case of the United States Government vs. United States Steel on charge of monopoly, disclosed an amazing quantity of iron ore in control of other interests. Moreover, as fast as needed, exploration brings in new reserves. The untouched possibilities in this direction are still enormous. Any serious attempt to monopolize reserves would serve as a spur for further exploration, and it is doubtful if purchases could keep abreast of the new offerings for many years to come.

Possibility of securing reserves for a new steel corporation.

Much the same remarks may be applied to the copper industry. The reserves are large, widely distributed geographically and under many ownerships. To bring them all together would be a gigantic and almost impossible task. The attempt would be a signal for further exploration and development for which the opportunities from a geological

standpoint are so large that it is questionable whether any single group could acquire reserves as fast as developed and stay solvent.

To go outside of the three fields of mineral industry here discussed, it appears that even in the oil industry, where there is some evidence of monopoly, this has not yet gone far enough to permit the use of lax and inefficient methods. When one considers the rapid and healthy growth of competitors of the Standard Oil Company in recent years, the geologic possibilities of new discoveries of oil, and the huge scale on which exploration for new reserves of oil are being prosecuted, there seems to be little danger for some time to come that comfortable conditions of monopoly will invite any lowering of standards of efficiency in recovery and extraction of oil.

If the modern tendencies toward combination and coöperation could be frankly recognized, permitted, encouraged under government regulation of conditions and prices, there is abundant opportunity for the exercise of government power to the mineral industries, of incalculable benefit to conservation.

Military Requirements in Relation to Conservation

The foregoing discussion is based essentially on peace conditions. In times of war, all would concede the necessity or desirability for more drastic application of government power. Measures become imperative, which in normal times seem unnecessary or doubtful. They may or may not be conservational in their effect. On the whole such war measures as are likely to be introduced, judging from European precedent, would seem to favor conservation. They would include the more rapid and effective introduction of certain measures possible only to the gov-

ernment, listed on preceding pages. Perhaps the most obvious result would be the enforced acquirement of a comprehensive and unit view of the mineral industries, making possible more intelligent formulation and more effective application of plans of conservation.

Conclusion

Most of the conservational measures already in operation in iron, coal and copper industries have been initiated by private enterprise for self-interest. The government has co-operated effectively, but this coöperation has not required essential sacrifice to private interest to the public or of present interest to the future.

Other conservational measures are possible in the field of privately owned mineral resources by wider application of government power in removing restrictions to private enterprise, without requiring essential sacrifice of private interest, such for instance as permission to coöperate under government supervision.

Immediately practicable steps in conservation possible to government.

Still other conservational measures which have been proposed, but not yet effectively applied, are mainly of the sort which require effective application of public power to require sacrifice of private interest to the public or of the present to the future. A consideration of these measures as applied to coal, copper, and iron industries, indicates that on the whole the need for, and the advantages to be gained by, the immediate and drastic application of public power are not so clear and conclusive as the advantages in the measures already in practice by private enterprise, or possible for private enterprise when certain restrictions are removed. Some of them seem to be immediately desirable, some may well be postponed until their advantage becomes

more apparent. Military considerations may hasten their application. The conclusions reached for these three mineral resources are believed to have somewhat general application to the field of mineral resources.

The above discussion should not be construed as an argument against the application of public power to further conservation of privately owned mineral resources. The writer fully realizes the excellent effects of governmental coöperation and intervention in the progress which has been made to the present and anticipates further good results in the future. This is written rather to plead for recognition of the importance and practicability of conservational measures in which there is no essential conflict between public and private, present and future, welfare.

Essential to recognize existence of private and public spheres of endeavor in conservation.

Neither does the writer argue for or against acquirement of privately owned mineral lands by the government. The purpose of this paper is to make clear the point that as long as the mineral industry remains in private hands large and important conservation measures are possible by coöperation of government and owners, to their mutual advantage.

We are not able to forecast what complex changes there may be in civilization which will modify requirements for different mineral products. We are not able to see what changes there will be in methods of extraction of mineral products, tending to make available many substances not now regarded as commercially important. We are not able to estimate even approximately the reserves which the earth has in store for us in the way of mineral products of present known value. Without accurate valuation of these factors, the introduction of drastic measures in the interest of the future is more or less guesswork. Later, as our

information becomes less fragmentary, it may be possible to project plans into the future with more certainty. In the meantime, there are the widest opportunities for development of conservational measures not directly inimical to present interest.

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PART IV

CONSERVATION OF HUMAN RESOURCES

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INTRODUCTION

THE HUMAN FACTOR IN NATIONAL PROSPERITY

One is tempted to write a general treatise on Economics under the title of this Essay. The conservation and utilization of the energy or working capacity of the people forms a very large part of the subject-matter of Economics. However, it is the purpose of the writer of this paper to present some phases of the problem which are commonly overlooked in current treatises rather than to cover the whole field.

The most valuable resource of any country is its fund of human energy, that is, the working power, both mental and physical, of its people. It is safe to say that any capable race of men who will conserve, economize and utilize that fund will be able not only to extract a living but actually to prosper in the midst of poor natural surroundings. On the other hand, if they fail to economize their fund of energy, if they waste and dissipate it, they will certainly decay in the midst of the richest geographical and material resources. New England furnishes a good illustration of the possibility of prospering in spite of a bleak climate, a sterile soil, and the absence of mineral resources. There is no way to explain this prosperity except on the ground of the conservation and utilization of the working capacity of the people. The economic virtues of intelligence, industry, sobriety, thrift, frugality, forethought and mutual helpfulness were rather highly developed among the old New England stock. Whatever

Value of human energy.

faults they may have had, they did not waste or dissipate their fund of human energy; at least they were less guilty in this regard than other people who prospered less in the midst of richer physical conditions.

It is perhaps unnecessary to point out that conservation does not mean the keeping of something out of use, though occasionally that meaning seems to be given to it. Conservation merely means the prevention of waste or destruction. When a thing which ought to be in use is kept out of use it may correctly be said to be going to waste. In that case, a conservation policy would consist in bringing it into use. On the other hand, when a thing ought to be held out of use in order to save it for a future need which is likely to be greater than the present need, a conservation policy would consist in preventing it from being used up in satisfying an inferior present demand and in saving it for the satisfaction of a higher need in the future. The storing of crops and holding them until they are more needed than at harvest time is conservation. Cornering them and holding them out of use in time of need is the opposite of conservation.

CHAPTER I

FACTORS IN THE ECONOMIZING AND THE WASTING OF HUMAN ENERGY

I. CIVILIZATION AS THE ELIMINATION OF WASTE

Civilization has been variously defined, partly no doubt, because civilization is a variegated and many sided thing. One of the best of these definitions is that civilization is the progressive elimination of waste in the expenditure of human energy, or the progressive economizing of that energy. If the most valuable resource of any nation is its fund of working energy, it must follow that the most destructive forms of waste are those methods, habits and sentiments which tend to waste that fund. Stated in another way, this means that the most important phases of conservation and economy are those methods, habits and sentiments which conserve and economize human energy.

There is a growing opinion among students of the problem that the moral qualities and habits of a nation have almost if not quite as much to do with its success as its intellectual qualities. Man has been enabled to hold dominion over the rest of the animal creation, not simply by reason of his greater knowledge of and control over the forces of nature, though that is undoubtedly one of the primary factors in his success. His dominion is also secured in part by his greater forethought, that is, his greater ability to subordinate the lesser interest of the present to the larger interest of the future. It is also secured

Economic value of moral qualities.

in part by his greater capacity for organization, that is, his ability to work together in groups. This depends upon his ability to subordinate the lesser interest of the individual to the larger interest of the group, the community or the nation. Again, civilized man excels the savage in these three particulars, and because of them he is able to hold dominion over the savage. Furthermore, within a civilized nation, they who possess these three powers in excess of their fellows will hold dominion over their fellows. Scientific knowledge, forethought and organization, these three working in combination, will doubtless in the future as they have in the past, give dominion to those who possess them in superior degree. The secret of it is that these are the factors which secure the greatest economy of human energy, which enable any group of people to accomplish the maximum with the working energy in their possession.

These three factors of national success are much more closely related to one another than is commonly understood.

Science, forethought and organization give civilized man dominion over the rest of creation.

Without scientific knowledge there would, of course, be none of those improvements in transportation and communication which have revolutionized the modern world, nor many of those mechanical improvements which have changed almost every industry from a handicraft to a factory. But, with all our scientific knowledge, very little use would be made of such things without that forethought which enables a people to expend labor, years or even decades in advance of the maturing of a finished consumable product. The coördinating of labor expended at different times is quite as essential as the coördinating of labor expended at different places. The former is the peculiar function of the capitalist in modern industry. Unless there are individuals with sufficient foresight to undertake this, and unless, which

is very improbable, the masses themselves have sufficient foresight to tax themselves for that purpose, that function will never be performed. There will be no coördination of labor performed at different times, which means that expensive machines will not be built.[1]

Again, even with the combination of scientific knowledge and forethought, if there is no effective organization to protect property and make it safe for any one who is disposed to undertake to coördinate labor which is performed at different times, there will be no inducement to undertake that function. But organization means more than the mere police protection of property. It means also the general trustworthiness of the average citizen, his willingness to stand by his word, even when he swears to his own hurt; in short, it means the calculability of human conduct. Where there is no such calculability, where no one can make even a tolerable guess as to what any other man is likely to do, there can be no effective team work among the citizens. Such a nation can never grow strong for the simple reason that it cannot economize its fund of human energy. There is no civilization, in other words.

[1] See the author's chapter on Socialism and the Present Unrest in his Essays in *Social Justice*, Cambridge, 1915.

CHAPTER II

II. MECHANICAL APPLIANCES

One of the first things of which the average man will think when you mention the economizing of human energy or labor power is that group of labor saving devices known as tools and machines. Probably the widest difference between modern civilization and ancient civilization, or between a modern civilized people and an uncivilized people, is the enlarged use, in the civilized nations of the present, of labor saving devices of a mechanical nature. These are simply devices for the economizing of human energy, for enabling a given fund of that energy to do more work, to produce more of the objects of desire and destroy more of the objects of repugnance.

It is not the purpose of this paper to discuss in detail the economies effected by the use of these labor saving devices. It will be sufficient to point out that it is the intelligence and adaptability of the population which enables them to make large use of these appliances. Scientific knowledge, inventiveness and ingenuity are behind it all, but they are not enough. There must be also the ability to work together in large groups; and, what is even more important, there must be such a moral and legal condition as will make property safe, otherwise there is no inducement to a large accumulation of tools and machinery. Francis Galton, in his great work on Hereditary Genius, discusses very wisely the traits which enable a people or a race to adjust themselves to

Without an adaptable population mechanical inventions are useless.

the modern conditions of machine production. He points out that there is little room in a modern industrial state for men of nomadic type. "No man who only works by fits and starts is able to gain his living nowadays; for he has not a chance of thriving in competition with steady workmen. If his nature revolts against the monotony of daily labor, he is tempted to the public house, to intemperance," etc. . . . "By this steady riddance of the Bohemian spirit of our race, the artisan part of our population is slowly becoming bred to its duties, and the primary qualities of the typical modern British workman are already the very opposite of those of the nomad. What they are now was well described by Mr. Chadwick as consisting of great bodily strength, applied under the command of a steady persevering will, mental self-contentedness, impassibility to external irrelevant impressions which carries them through the continued repetition of toilsome labor steady as time."

CHAPTER III

III. IDLENESS AS A SOURCE OF WASTE

We must go much deeper than we have yet gone before we find the ultimate causes of waste. The lack of scientific knowledge may be due to a multitude of causes, as may also the lack of foresight or of organization.

Before going into this, let us consider some of the conspicuous forms of wasted human energy which result from a lack of knowledge, a lack of forethought and a lack of organization. These conspicuous forms of wasted energy,—or of wasted life,—for life is energy,—are idleness, ignorance, dishonesty, luxury, vice and distraction. Idleness may be subdivided into two main forms, the involuntary and the voluntary.

(a) The Unemployed.

The most conspicuous form of involuntary idleness is that which we sometimes see in the army of the unemployed. In good times this army becomes merely the army of the unemployable. In hard times it is something more. Nevertheless, there is a shading off from the unemployable to the unemployed even in hard times.

The involuntarily idle, or the unemployed, form a less vicious kind of waste than the voluntarily idle or the leisure class. There are two main reasons for this statement: first, the involuntarily idle, are, broadly speaking, the least valuable members of society. They are the people with the least capacity for doing useful work—with perhaps many brilliant exceptions such as an

The unemployed not the greatest source of waste.

unappreciated genius who might be doing valuable work if the people whom he could serve only had the wisdom to appreciate his services. Generally speaking, however, it is safe to say that the army of the unemployed is not made up in the majority of cases of geniuses. If a piece of sterile or stony land lies idle we do not consider it much of a loss for the reason that, even if it were in use, its product would be very small. If, on the other hand a piece of rich and fertile land lies idle, we have a right to consider it a much greater loss, because if it were in use its product would be large. The same process of reasoning would lead to a similar conclusion with respect to human talent, or working capacity, or human energy as it is called in this essay. Men of little capacity, men whose productive energy is limited or merely over-supplied, are not capable of producing much even if they are busy; therefore, the community does not lose much when they are idle. But men of great capacity, who might contribute largely to our national wealth, are the men whose labor we most need, therefore it is a great loss if they are idle.

The only question that is likely to be raised with respect to this conclusion is whether the mere fact that a certain kind of labor is over-supplied tends to make it unproductive. If we were discussing anything else than labor, even this would probably not be questioned. The confusion with respect to labor is partly sentimental and partly due to defective analysis. One form of defective analysis is embodied in the statement that since labor produces all wealth, therefore labor can never be over-supplied. The reply to this in that the kind of labor which is unemployed does not produce all wealth. It has to be combined with certain other kinds of labor before it can produce anything to speak of. The miller

In a dynamic society, labor which is over-supplied is of little value per unit.

could not produce flour unless there were farmers growing wheat. There might easily, therefore, be an over-supply of millers in any community. Again, the millers could hardly sell their flour if there were no bakers; and a scarcity of bakers might therefore make an over-supply of millers in any particular time and place. So the men who are on the bread line in the time of unemployment may represent kinds of labor which are over-supplied even though labor in general is not.

If the proposition that labor produces everything really meant very much and were capable of practical application, one ought to be able to go to the men on the bread line and say to them, "Gentlemen, you are laborers; labor produces all wealth; therefore, produce wealth." The utter senselessness of this proposition would at once appeal to every hearer. It takes several kinds of labor to produce real wealth; and a scarcity of one kind may make a super-abundance of another kind.

The kind of labor which is unemployed does not produce all wealth.

This is the method of reasoning and analysis which we apply to everything else except labor. Not long ago the writer was at the home of a professor of agriculture in one of our leading agricultural colleges. The grass was growing up through the cracks in the brick walk in front of his house. He put fertilizer in the cracks to kill the grass, and it worked effectually because there was too much fertilizer and not enough of the other elements of plant growth. With an abundance of soil and moisture and other elements of plant growth, the fertilizer would have made the grass grow faster. In that particular case, where the other elements were absent, the fertilizer was not only non-productive but absolutely destructive. Cases of a similar character are continually coming to our attention. Some of our soils are already too rich in

It is a question of the advantage of more, and the disadvantage of less.

nitrogen and deficient in potash. The ordinary fertilizer rich in nitrogen is not only useless on such soil; it may be destructive. Yet nitrogen in its proper proportion to other things is a highly productive ingredient in fertilizers.

But we need not go into soil chemistry to find similar illustrations. In some parts of the country water has to be drained off the soil because there is too much; in other parts water has to be put on the soil because there is too little. To attempt to sell water to a farmer whose land is already too wet, on the statement that water is necessary to all plant growth, would be no more futile than to try to sell a certain kind of labor to a man who has a surplus of it, on the ground that labor produces all wealth. Therefore, even if the members of the army of the unemployed are not less capable on the average than the members of the army of the employed; if they merely represent an oversupply of special kinds of labor, their labor becomes of as little value to the community as water to a farming community in the humid belt. To be sure, it might be said that this labor would be valuable if it could be trained to do something else. These phases of the question will be discussed under the heading of ignorance.

Speaking of the super-abundance of water in one place and scarcity in another suggests a certain analogy to the labor market. If there is too much labor of a certain kind on one spot, it does not solve any problem merely to point out that there is an abundance of land in Texas, unless some measure is taken to get that labor removed from the spot where it is overabundant to the spot where it is underabundant or scarce. It is true that much of the talk about moving labor from one place to another is exceedingly unintelligent, because the speaker frequently has no real knowledge as to the opportunities for labor in other places. To point

out that there are many vacant acres in the Desert of Sahara is not conclusive evidence that there is an opportunity for labor there. Before we attempt to move labor from one place to another, we must be quite certain that there is an opportunity in the other place for the particular kind of labor we are about to move.

The occupational distribution of the labor supply.

There appears to be a much greater need for the occupational redistribution of the labor supply than for the territorial redistribution. By the occupational redistribution, the writer means the training of labor for those occupations where men are scarce and hard to find, and out of, or away from, those occupations where labor is abundant and easy to find. This again will be taken up under the subject of ignorance.

A great deal can doubtless be done also by finding work suitable for the involuntarily idle, in the place where they are forced to live. The Massachusetts School for the Feeble-Minded has carried out a very successful experiment in this direction. About three hundred of the more capable men and boys of the institution are placed on a farm where their labor can be utilized in the work of clearing stones, draining the land and doing other rough work. The result is that the State now has several hundred acres of highly productive land where formerly it had nothing but rocky land grown up to brush and briars. The fund of labor which is thus utilized is about the most unpromising kind of labor which any State possesses. But it serves as an illustration to show what can be done toward the utilization of waste labor power when we go at it intelligently.

Another class of waste labor power is found in the aged men who have become incapacitated for the work to which they were trained in their youth. The inventor who can

devise methods of utilizing this considerable fund of human energy will be a large contributor to the civilization of future generations, referring again to the definition of civilization as the progressive elimination of waste. We are not likely to be over-cautious, however, against the mistake of saving at the spigot while wasting at the bunghole. It is sometimes cheaper to support men in idleness than to give them work; that is, we may lose more on their work than it would cost us to support them. A bungling or inefficient laborer who is handling valuable machinery or perishable materials may destroy more than he produces. The problem of the inventor is, in this case, to find the kind of work for waste labor which will at least reduce rather than increase the cost of keeping it.

Difficulty of utilizing the labor of the aged.

(b) The Leisure Class.

As to the voluntarily idle, that is, the leisure class; it is generally true that its members possess large natural capacity. Occasionally, it is true, there may be an imbecile living on inherited wealth, just as before stated there may be geniuses out of work; but on the average and in the long run, they who have achieved a fortune which enables them to retire and live in idleness must have possessed considerable ability. If that ability is misdirected, it is as truly wasted as if it were idle. This ability is like the rich and fertile land which lies idle. If it were put to some productive use, its product would be great. Therefore, the loss is great when it is idle.

When talented men go to waste the loss is great.

One section of the leisure class consists of the retired farmer or the retired business man. Fortunately, in this country the retiring habit is not so general as it is in older countries. Our business and professional men of conspicuous talent are more inclined to keep at it than are

similar men in older countries. This is greatly to our advantage as we are therefore better supplied than we would otherwise be with working energy of a high grade.

1. That Indiana Farmer.

There is a story in wide circulation, with such variations as suit the locality where it is told, of a farmer, usually an Indiana farmer, whose chief ambition in life was to grow more corn to feed more hogs, to buy more land to grow more corn to feed more hogs, etc. No one with a well-developed sense of humor is supposed to require an explanation to enable him to see the joke. It seems so futile to the average mind to spend one's life growing corn and hogs in order that one may grow more corn and hogs that, aside from the tragedy of such a wasted life, it seems positively funny—that is, until one stops to ask one's self what there is funny or absurd about it. Then one begins to be haunted by the suspicion that the joke may be on the teller of the story and not on the farmer. Possibly the farmer was functioning as a very useful member of society, possibly he was more useful even than any of those humorists who have so often repeated the story about him. If so, is not the joke reversed?

It might be difficult to convince certain high-browed idealists that growing corn and hogs is useful work; but the writer has known several such persons who showed a liking for breakfast bacon, and would have registered pained surprise if their supply had not been forthcoming when they casually appeared at the breakfast table at a late hour in the morning. Now, it is not necessary that a high-browed idealist should be either well informed or consistent; but if he were well informed he would know that corn and hogs are necessary to the production of breakfast bacon, and if he were consistent he

Specialization, even in growing corn and hogs, is advantageous.

would not affect to despise the humble producer of his breakfast. However, it is quite conceivable that our high-browed idealist may not despise the production of bacon as such, but that he may think that the farmer should not make that his chief ambition. Then the question would arise as to whether we are likely to have as good bacon, or as efficient production of corn and hogs, by men who think poorly of their work as by men who make it their chief ambition. In almost every other field it is generally assumed that we get better results when men specialize and give their lives to the mastery of one trade or occupation. Why, then, should we withhold our admiration from the man who chooses the growing of corn and hogs as his life work and devotes his life to it—that is, assuming that corn and hogs are useful products? Our idealist's objection, however, may be on the ground that the farmer should have spent a part of this time, at least, in cultivating idealism in himself. This, as will be maintained later, is precisely what, in the terms of the story, that farmer was doing in the best possible sense.

Another type of man, with no great disposition toward any kind of idealism, but with a strong desire for his own amusement, would probably criticise that Indiana farmer because he wasted his time in producing wealth which he never took time to enjoy. If, instead of continuing in business he had retired, he might have spent the latter part of his life in ease and comfort —perhaps in a moderate degree of luxury. At any rate he could have avoided work. Since men who reason thus very likely outnumber the high-browed idealists, it is probable that it is this aspect of the case which appeals to the average sense of humor when the example of that farmer is cited. Wealth is so obviously intended for consumption

Productiveness may be a genuine ideal.

that it seems absurd for a man to go on producing after he has accumulated more than he can consume! Since we are in the world for the purpose of having a good time, to get as much as possible out of the world rather than to put as much as possible into it, no one with any sense of humor could help laughing at that farmer! One may remark, parenthetically, however, that no great religious or moral teacher ever had that kind of a sense of humor, for none of them ever said that we were here for a good time, or that it was our purpose to get as much out of the world as possible. They have even gone to the absurd length of suggesting that we should put as much into and take as little out of the world as possible, which means literally that we should produce or serve as much as possible and not stop serving in order that we might consume.

There is a story of another farmer who did precisely what the average man probably thinks that Indiana farmer ought to have done. After he had prospered and builded his barns larger in order to hold his produce, he decided to retire from business and enjoy his well-earned competency. That is, he remarked to his soul, "Soul, take thine ease; thou hast much goods laid up for many years. Eat, drink, and be merry." But, strangely enough, this story, which may be set over against that of the Indiana farmer, was not told for the purpose of furnishing an example for us to follow. In fact one of the principal teachings of the teller of this story was that men should continue to produce, that is, serve, and not give themselves over to useless consumption, which is self-indulgence. He certainly would not have appreciated the humor of the story of that Indiana farmer. Perhaps, however, he lacked a sense of humor!

"A certain rich man."

Of course, corn and bacon are commonplace, and their production is a more or less plebeian occupation. Still another story might be told of a certain great artist, Michaelangelo by name, who, in another field of production, worked all his life with a kind of demoniac energy. There is no evidence that he ever showed any inclination to slow up, to retire from work in order that he might consume his earnings. Somehow we do not speak of him as having wasted his life in mere work when he might have had a good time, nor do we think it particularly funny when we hear how he kept on working even when he might have enjoyed elegant leisure and graceful consumption. To be sure, Michaelangelo was a genius and that Indiana farmer was not; but the fault of not being a genius is very wide-spread. If that be an unpardonable sin, few of us will ever be saved. Most of us, in fact, will have to be content with some commonplace or plebeian occupation. We may lay unction to our souls if it is as useful as producing corn and bacon.

Great geniuses have seldom stopped to enjoy consumers' satisfactions.

When we find a great genius working all his life, getting more joy out of his work than he could possibly get by stopping to consume his earnings, none of us is so irreverent as to make a joke of it. Is there any reason why a lesser mind should not get joy out of a lesser work, even the producing of corn and hogs? In short, should not the same general rule of action govern the genius and the plodder? If it would have been a great loss to the world if a Michaelangelo, or a Thomas A. Edison, had stopped working in order to "loaf and invite his soul," is it not with equal certainty a loss to the world, though a smaller one, when a commonplace man stops a humble though useful work, for the purpose of self-cultivation or self-amusement?

The present writer desires to take up the gauntlet as the champion of that Indiana farmer, and to maintain that he illustrates precisely what every man is in duty bound to do, whether he be an inspired producer of works of genius or a commonplace producer of plebeian products. There is no higher ideal of conduct than to keep on producing as hard and as long as one can, provided one is producing that useful thing for which one is best fitted. It has never been suggested that that Indiana farmer could produce anything better than corn and bacon. If so, it would be a different story. Somebody must produce corn and bacon so long as we need them. The more efficiently farmers can be induced to work, the better the world will be supplied. The more farmers there are who follow the example of that Indiana farmer, the better corn and bacon we shall have; the more there are who follow the example of that other farmer who said "Soul, take thine ease," the poorer farming we shall have, and the poorer will be our supplies of corn and bacon. What has been said about farming applies equally well to every other occupation, from that of the most transcendent genius to that of the humblest laborer. Point out a community where this ideal prevails and the present writer will show you a prosperous, a progressive and even a cultured community. Point out a community where the opposite ideal prevails, and he will show you an unprosperous, a decadent, and, in the end, an uncultured community.

The uninspired plodder might well imitate the genius in this respect.

It will be remembered that that farmer who after having builded his barns bigger decided to retire from business had joined the leisure class. Now, it is here maintained that where that is the normal ambition of all men throughout the community, the result will be that the highest and most productive talent will go most to waste. The most suc-

cessful would be the one who would earliest acquire a competency and who would, therefore, retire from business earliest in life, and waste in unproductive living the largest portion of his potentially productive life. The less competent farmer might have to work all his life, for the simple reason that he never could accumulate a competency. The same would apply to the business man and the professional man. The very men, who, in the interest of the community at large, ought to remain active, are encouraged by this false ideal to become inactive, and the men whose activity is least valuable to the community are the men who would be compelled by necessity to keep on working. We must conclude, therefore, that its fund of human energy is not only the most precious possession of any community; but also that a general and widespread desire for leisure is a means of wasting the most valuable portion of that fund. In order to avoid this we must cultivate the productive ideal. We must uphold the idea that because a man is preëminently successful in any kind of useful work is the greatest and most cogent reason why he should keep on working: he is the man most needed. If that Indiana farmer was a successful grower of corn and hogs, that was the very reason why he should have kept on growing corn and hogs. If he had been unsuccessful, there might have been some reason for encouraging him to retire from business.

The most capable are they who can, if they will, retire from business earliest.

But they, of all men, ought not retire.

The carnal mind, however, is so prone to the opposite theory that this theory of life will seem revolutionary. What is wealth for except to consume? When one has builded one's barn larger, why should not one say "Soul, take thine ease"?

In certain low states of civilization it has been observed

that the only way to keep laborers at work is to pay them low wages, keep them in debt, or keep them poor in some way. If, for example, a laborer in that civilization can earn enough in three days to keep him for seven, he will work only three days a week. Whereas if it takes six days' wages to supply his needs for a week, he will work six. This principle of conduct, however, is not confined to southern negroes and Mexican peons. It shows itself in different forms in different places, but the principle is the same. If a man can earn enough in four hours to keep him for twenty-four, he will sometimes work only four,—that is, he will go to his office at ten o'clock a. m. and work till two p. m. and then play golf or go to his club for the rest of the day. Or, if a man can earn enough in twenty years to keep him for the rest of his life, he will only work for twenty years,—that is, he will retire from business and spend the rest of his life in self-enjoyment. Will any one undertake to maintain that there is any economic or moral difference between the attitude of the laborer who works only three days a week because he can earn enough in that time to keep him the whole week, and the business man who works only four hours a day because he can earn enough in that time to keep him the whole day, or who works only twenty years because he can earn enough in that time to support him for the rest of his life? They who see so much humor in the story of that Indiana farmer are asked to ponder this question very carefully, but they are asked not to confuse the man who retires from business in order that he may work equally hard at some other and more useful occupation with the man who retires merely to indulge in the passive enjoyment of using up his accumulated wealth.

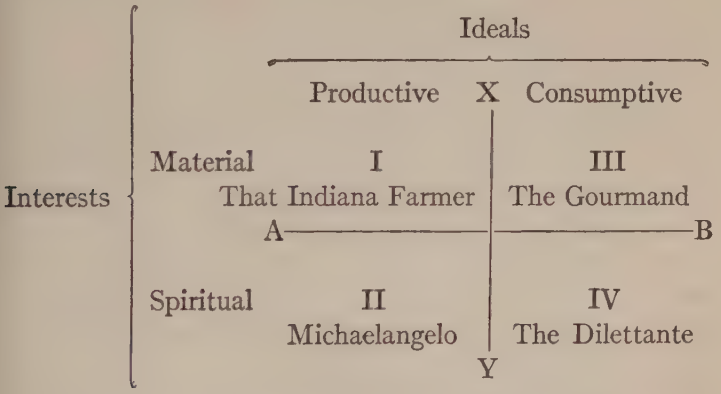
The peon desires leisure more than added income.

He is very much like the rest of us.

A particularly erroneous ideal permeates our so-called

cultured or highly-educated classes. This ideal emphasizes the distinction between material and spiritual interests, with the consequent tendency to despise material products and those who produce them, and to appreciate only the products of the spirit and those who produce them. There is another distinction which is very much more important than this and which cuts straight across it. That is the distinction between the ideal of production and the ideal of consumption. One's production is one's contribution to the world. One's consumption is one's subtraction from the world. These two distinctions may be visualized by the following diagram:

Productive ideals should be held up to the cultured classes.



In this diagram the line AB, we will assume, represents the division between material and spiritual interests, whereas the line XY represents the distinction between the productive and consumptive ideals. The crossing of these two lines makes four compartments in which we may place people of varying characteristics. One may have a productive ideal of life, but his field of production may be material rather than spiritual. This would place him in

the first compartment, along with that Indiana farmer. One may also have a productive ideal of life, but one's field of production may lie within the spiritual zone. This would place him in the second compartment along with, let us say, the Michaelangelos. On the other hand, one's ideal may be that of a consumer and his form of consumption may be material. He belongs in the third compartment along with Falstaff or that farmer who "builded his barns bigger" and then retired from business. Again, one's ideal of life may be that of the graceful consumer, but his field of consumption may lie wholly within the spiritual zone. This places him in the fourth compartment along with such spiritual Sybarites as the æsthete who regards it as his chief mission to "loaf and invite his soul."

Now, it is the contention of the present writer that the line XY is very much more important than the line AB; in other words, that the distinction between the productive and the consumptive ideals of life needs very much more emphasis than does the distinction between the materialistic and the spiritual zones of action. Moreover, it is his contention that there is a strong tendency among the so-called cultured and highly educated classes to emphasize the line AB rather than the line XY, and that this tendency is vicious and should be combated. Because that Indiana farmer is found on the productive side of the line XY, it is contended that he is an idealist in the proper sense.

2. Retiring from Business.

The habit of retiring from business as soon as one has accumulated a competency has the peculiarly disastrous effect of wasting the talent which is scarcest and most needed. The more valuable an individual's talent the sooner, on the average and in the long run, will he be able

to accumulate a fund of wealth sufficient to support him during the rest of his life. The earlier, therefore, he will be able to retire, and the greater portion of his life will be wasted. The author has in mind, for example, a great surgeon whose knowledge and skill have blessed large numbers of people. He was so successful and so much in demand that he could easily have retired from active work years ago. He is the sort of man which society can least afford to spare. If he were less skillful and less successful, it would be no great loss if he should retire from active work. Because his skill is so scarce and so precious, it would be a great loss if it were allowed to go to waste, that is, to remain inactive.

Again, it may be said that there is a difference between the work of the genius and that of the plodder; that the growing of corn and bacon does not appeal to the imagination as does the healing of the sick or the artistic work of a great genius. Yet it is useful work, and the same principles of conduct should apply to all. This economic principle which we see with such clearness when applied to the work of the great surgeon or the great artist applies equally well to the work of all. It is doubtless this economic principle which was in the mind of the teller of the story of the farmer who builded his barns bigger and then retired from business.

Society's greatest waste is the waste of rare talent.

The case of the great business organizer, the successful investor and the captain of industry, ought to be quite as clear in principle. Is it not clear that the more successful investors we have and the more great captains of industry we have, the greater will be our industrial expansion? The larger the number of productive enterprises which are started and run successfully, the larger the number of laborers who will be required to man these establishments.

Unless the supply of labor increases correspondingly, this increase in the demand will tend to raise the wages of all, and to give employment to the employables who are now unemployed.

If it were the habit of these captains of industry and successful investors to retire from business as soon as they were financially able to do so, the result would be that the best men would retire at the earliest age, leaving the less successful men to bungle along merely because they were never able to accumulate enough to enable them to retire. This would mean a less successful administration of our business affairs, fewer successful business establishments, less demand for labor, lower wages and more unemployment.

3. Pensions.

There is a real danger at this point in the system of pensioning university professors. Of course it was intended, when our various pension systems were devised, that a retired professor who was still in full mental and physical vigor, should be able to devote the last end of his working life to research or to the publication of the ripened fruits of his scholarship. But it seldom works out that way, as might been have foreseen. The man who late in life undertakes to make a complete change in the character of his work seldom makes a success of it. The retired farmer who has been active in outdoor muscular work all his life soon loses his health when he tries to lead a life of ease. The university professor who has been for many years in active teaching, has had to meet his classes regularly, and to keep himself in sympathetic touch with an ever changing body of young men, has come to depend, more than he himself suspects, upon that contact for his stimulus. When he retires from teaching he breaks

Pensions sometimes waste the best years of a man's life.

his contact with his chief source of stimulation and inspiration and seldom does any first rate work afterward.

Of course, if he has reached an age when he is no longer an efficient and inspiring teacher, his room is worth more to the University than his work. Then it is economical for all concerned that he should be got rid of; and a pension seems to be more satisfactory than the other proposed solution of the problem, namely, chloroform. Besides, he may easily earn his keep by devoting himself to what Victor Hugo called the gentle art of being a grandfather, especially if he combines it, as is commonly done by men of reverend years in China, with the work of growing morning glories. Having passed beyond the years when he can be a leader in the ways of strenuosity, he is now peculiarly fitted to become a leader in the Way of Contentment. Like Isaac he may go forth in the evening to meditate. This may, after all, be the most valuable work of his life.

But his fitness for leadership in the way of contentment is not achieved until he has achieved his unfitness for leadership in the ways of strenuosity. There is the danger. If he is retired while his physical and mental force are still unabated, he is more likely to eat his heart out in impatience than to walk the way of contentment. What is more to the point, several of his best years are wasted which might have been very productive.

It is sometimes argued, however, that it is better for the younger men to have their elders retired early. They can be promoted more rapidly and are therefore encouraged by this prospect to fit themselves for academic careers. It hardly needs to be stated that universities are not run to give attractive positions to ambitious young men. If a smaller number of men, by working a greater number of

years, can do the necessary teaching without in any way deteriorating the quality of the teaching, there are then more capable young men available for other kinds of work which need to be done. If every talented man could work for a longer period of years without loss of quality, it would have the same effect upon the total available supply of working talent as an increase in the total number of talented men. That increase in the supply of working talent is the very thing of which society stands most in need. No other need deserves to be mentioned in the same breath with this one.

One of the dangers in the present agitation for old age pensions is that it will beget the vicious and demoralizing idea that the chief ambition of the average man should be to be able to do nothing. That idea is too widespread now and needs to be combated rather than supported. It is too commonly assumed that a man ought to stop working and begin to loaf as soon as he is able. It is sometimes put euphoniously in this way. "Having worked all my life, I am now going to 'live.'" Aside from the shamelessness of this method of beclouding the issue, it is an error to suppose that a man "lives" more or better when idle than when working. Instead of pensioning men indiscriminately, which is a cheap and easy method of taking care of them if one looks at it short-sightedly, it would be very much better to see first whether some other kind of work might not be found for the man who has become too old for his old job. It would be, in most cases, very much better for the man himself, besides being more economical for society. This would be a little more trouble,—would require us to undergo the painful process of thinking a little more than the crude policy of old age pensions, but it would yield much better results in the end. It would

also be much more welcome to the type of man whom it should be our chief concern to benefit,—that is, the strenuous and productive type.

4. The Distribution of Talent.

Enough emphasis has never been laid by any economist on the principle of "joint demand" as Marshall calls it, or "complementary goods," or "non-competing groups" as others have called them. With respect to commodities, we are all familiar with the fact that frequently the supply of one commodity creates the demand for another; whereas, the lack of one commodity may destroy the demand for another. This holds true wherever several different commodities have to be combined in the production of the same result. In order to make gunpowder, for example, it is necessary to have charcoal, saltpetre, and sulphur in certain fairly definite proportions. If it should happen in any community that there was an abundance of charcoal and a scarcity of saltpetre, a good deal of the charcoal would be unemployed or unused, at least in the powder-making industry. Charcoal would be going to waste primarily because there was not enough saltpetre to mix with it. Anything which would increase in that community the available supply of saltpetre would increase the demand for charcoal, assuming of course that there was a demand for gunpowder as a finished product. Anything which would still further reduce the supply of saltpetre would still further reduce the demand for charcoal. Under such conditions it would be natural and just that saltpetre should command a high price and charcoal a low price—a high price for saltpetre being society's method of calling forth a larger supply; a low price for charcoal being society's method of discouraging an over-supply. Now if, as a result of this, all the pro-

Society needs a balanced population.

ducers of saltpetre were so well paid and so desirous of leisure as to induce them to take advantage of their prosperity by retiring from business, things would go on from bad to worse. The higher the price of saltpetre the more prosperity to the producers of saltpetre; and the more prosperity the earlier they would retire from active business. The retiring habit would, in that situation, be a serious interference with the process of readjustment.

Precisely the same principle applies to labor as to commodities. It frequently happens that different kinds of labor have to be combined in the production of a given commodity. Spinners and weavers, for example, are both necessary in the production of cloth. If we could imagine a situation where there were many spinners but few weavers, the scarcity of weavers would limit the demand for spinners just as effectually as the scarcity of saltpetre, in the foregoing illustration, limits the demand for charcoal. Anything which would increase the supply of weavers would increase the demand for spinners; and vice versa, anything which would diminish the supply of weavers would diminish still further the demand for spinners. It is true that men can be taught new trades, and therefore an over-supply of spinners could be relieved by training more weavers. But when we consider occupations which require vast differences in skill and training, the process is not so easy. Recently a glass manufacturer desired to develop a new branch of his industry. In order to do so, he required one or two men with a highly specialized technical training. He tried to find these men and offered as high as twenty-two thousand dollars a year salary. He failed to find them. As a result of this failure he did not enlarge his establishment. Therefore he did not give employment to several hundred men to whom he would have

given employment had he been able to find these two men with a high degree of technical skill. Here was a case where scarcity of one kind of skill reduced the demand for other kinds. The operation of the principle is just as clear and concise in this case as in the case of the charcoal and saltpetre.

There is no reason to believe, however, that a scarcity of this particular kind of skill is due to the retiring habit. It is due, rather, to the lack of that specialized technical training which would aid in redistributing human talent, in other words, to ignorance. Ignorance here, however, is used not in the sense of a crass and degraded state of mind, but merely in the sense of a lack of knowledge. The problem of ignorance will be discussed later.

5. Inherited Wealth.

Another cause of the waste of human talent, as things now work out, is found in the institution of inherited wealth. They who join the ranks of the leisure class or the voluntarily idle are less likely to be the individuals who themselves have accumulated fortunes and retired from active work than their descendants of the second or third generation. In order to consider this phase of the problem it is not necessary that we assume any attitude either friendly or hostile toward inherited wealth as such. The writer certainly has no grievance against those who are living on inherited wealth. They are not depriving him of anything which is his or which he has earned. But the fact can hardly be disputed that the individual who lives in idleness is going to waste. If it is inherited wealth which enables him to live in idleness, it is the inherited wealth which causes him to go to waste. The present writer has elsewhere classified wealth as consisting of earnings, stealings and findings. The fortunate

They who live idly on inherited wealth are going to waste.

possessors of wealth which is merely found and not stolen, such as inherited wealth which comes to them through the accident of birth, are not in any sense reprehensible, nor has anyone else a real grievance against them. But the question is not one of grievances. The question is one of the economy of human talent or the conservation of human energy.

Whenever it becomes a general observation that inherited wealth is made, more frequently than not, the means of enjoying leisure, or in other words, of wasting human talent, it will then be time to consider seriously the question of limiting inheritances or even of abolishing them altogether. So long as the possessors of inherited wealth continue to use their talents productively, no possible harm can result, and there would be no reason for an agitation against them.

6. Lawlessness.

Much enterprise is repressed by lawlessness.

In times past, before the outbreak of the present European War, we Americans were in the habit of thanking our stars that we were not compelled to support vast standing armies or to waste two or three years of the productive period of young men's lives in unproductive military service. All this time we needed to be reminded that we were very dark pots engaged in the pastime of calling kettles black. It is not at all improbable that these same young men would acquire discipline which would more than compensate for the time spent; that is to say, during the total lifetime of the average man he may have been able to contribute more to the national wealth and progress by reason of those three years' discipline than he would have been able to do if he had not had them. While we have maintained a smaller standing army than European nations, the general rowdyism and ineptitude

which characterize our people are topics on which we have not cared to speak. Even if we never needed an army, it is not improbable that it would be a good thing for us to have compulsory military service for the sake of the discipline which it would bring with it, provided of course, we could not find another means of discipline which would answer the purpose equally well.

7. Lawyers and Priests.

Litigation, like war, is waste.

Again, we have not cared to expand much on the fact that we support more lawyers than any other country. What is even worse, much of our very best talent goes into the legal profession instead of going into productive work. If international war is wasteful, so also, in a less degree perhaps, is private litigation among the citizens of the same country. We have to support not only an army of lawyers but to waste a great deal of other valuable talent in these unprofitable litigations. This is not saying that the profession of the lawyer is not one of the most respected and honorable of all occupations. So long as litigation exists and rights and obligations have to be enforced by law, we must have men who devote their lives to this work. The same argument applies to the profession of the soldier. So long as we cannot escape the necessity of national defence, the military profession is one of the most, if not the most necessary and honorable of all occupations. Nevertheless, it is highly desirable that we should, and everyone, even the soldier, hopes that we may, very soon eliminate the necessity of fighting. Among other advantages it would release for other work much splendid talent which now goes into the military profession. The same may be said regarding litigation. No one, not even the lawyers, believes that litigation or legal disputes are desirable. Everyone will agree that it would be better

if we could, and most of us hope that we may, greatly reduce the amount of work for lawyers to do. Among other advantages this would release for other necessary work much of the splendid talent which now goes into the legal profession.

Travelers in Southern Europe must have been impressed by the large numbers of priests and their high average ability. Except where this talent is employed in constructive leadership, it is a serious drain upon the human resources of those countries. If it were the stupid and inefficient who were thus withdrawn from productive work the loss would be vastly less. Every one of those countries is suffering from the lack of constructive talent in such fields as scientific agriculture, engineering, and business.

One must not be unmindful, however, of the splendid service performed by the monks of an earlier day in preserving the learning of the ancient world and handing it down to the newer civilization of modern Europe and America. Their part in the civilizing of the rude barbarians of northern Europe entitles them to the respect of all mankind. The laboring monks especially call for our admiration. The clearing of the land, the draining of the swamps, the preservation of the arts of horticulture and agriculture, and the further development of both, was constructive work of the very highest order. Moreover, it was performed at a time when constructive industry was all but submerged by the general brutality and violence which prevailed over the whole of Europe. In those countries where the priests are still doing that kind of work, they deserve the highest commendation. The countries with the largest numbers of such priests are the countries which are advancing most rapidly, not only in the arts of civilization, but in wealth and power as well. The way in which

they are using their influence to decrease the number of holidays is of the highest utility and must have a profound influence upon the national efficiency. One cannot help being impressed also with the fact that much of the co-operative work among the farmers of Ireland, Belgium, Holland, Denmark and Germany is fostered by the priests in catholic communities and by the pastors in protestant communities. The president of the local coöperative society is usually the priest or the pastor.

CHAPTER IV

IV. IGNORANCE AS A SOURCE OF WASTE

The ineffectively employed.

Coming to the subject of ignorance, we have to charge it with a vast amount of wasted human talent, that is, talent which goes to waste because it is imperfectly employed. We have men who are compelled to do a lower grade of work than they might otherwise have been compelled to do, had they been properly educated. He who is compelled by circumstances to do a less useful work when he might have been doing a more useful work, is going to waste in part at least. He is like a Raphael painting a barn or a Beethoven playing a mouth-organ. There is a very close analogy between a sound educational policy and a productive industry. All industry, as was pointed out long ago, consists in moving materials from one place to another. Back of this process of moving things from one place to another is a fact which does not appeal to the physical eye, namely, that we are moving things from places where they are useless or less useful to places where they are useful or more useful; and other things from places where they are harmful or more harmful to other places where they are useful or less harmful. This implies, in other words, that in any time and place in which a man finds himself, there are some things which are too scarce and others which are too abundant for his comfort. He must immediately set to work readjusting things, and this readjusting takes the form of moving things. Of any great society the same is equally true.

It finds itself in the presence of some things which are too abundant and must therefore be thinned out; it finds itself in need of other things which are scarce and must therefore be increased in quantity. All industry is directed towards these ends.

Our whole process of valuation, whether it be in the commercial, the moral or the intellectual field, is determined and directed by this primordial situation. Anything, whether it be a material commodity, a moral quality, or a mental attainment, of which the community can say that it would be better off if it had more of it, is highly esteemed, that is to say, valued. Anything, on the other hand, of which the community can say that it would be better off if it had less of it, is disesteemed. This also is true whether the thing in question be a material commodity, a moral quality, or a mental trait. The purpose, therefore, of industry is to diminish the things which are disesteemed, that is, the things of which the community feels that it has too much or of which it thinks that it would be better off if it had less, and to increase the things which are scarce, that is, the things of which it feels that it would be better off if it had more.

All values based on the same fundamental principle.

Similarly, the purpose of morals and religion is to decrease those moral qualities of which the community feels that it has too much or that it would be better off if it had less, and to increase those moral qualities of which it feels a scarcity, or thinks that it would be better off if it had more. Following this parallelism a step further, we may say that the purpose of all education is likewise to diminish those mental traits, tendencies or capacities of which we seem to have too much, and to increase those of which we seem to have too little. This is the great law of economy in all fields of endeavor, and it brings commercial valuation,

moral valuation and educational valuation under one and the same law.

a. The Correct Theory of Education.

The correct theory of education is embodied in the inscription on the west gate of the Harvard Yard:

> AFTER GOD HAD CARRIED US SAFE TO NEW ENGLAND
> AND WEE HAD BUILDED OUR HOUSES
> PROVIDED NECESSARIES FOR OUR LIVELI HOOD
> REARD CONVENIENT PLACES FOR GODS WORSHIP
> AND SETLED THE CIVILL GOVERNMENT
> ONE OF THE NEXT THINGS WE LONGED FOR
> AND LOOKED AFTER WAS TO ADVANCE LEARNING
> AND PERPETUATE IT TO POSTERITY
> DREADING TO LEAVE AN ILLITERATE MINISTERY
> TO THE CHURCHES WHEN OUR PRESENT MINISTERS
> SHALL LIE IN THE DUST

It will be noticed that nothing is said about the dread lest some young men should fail of self-development, or lest they should fail to get the most out of life. It indicates, on the other hand, that the founders of Harvard felt that there was a distinct social need. After the present ministers should lie in the dust there would be a scarcity of the kind of talent which the founders regarded as very necessary. In other words, the institution was created to train men for what they thought to be a genuine social need—to make the kind of talent abundant which would otherwise be scarce. Whether we agree that their diagnosis was right or not; that is, whether we agree or not that the colony did need ministers, we can hardly afford to reject their theory of education, namely, that education

The social needs should determine educational policy.

should aim to supply the kind of ability which society needs. It must have been apparent to these founders that every time a man was trained for the ministry there was one man less for some other job. Still, this would not have deterred them if they had felt that they would train men out of less useful into more useful occupations. Any educational system, on the other hand, which professes merely to give men a gentlemanly appreciation of the ornamental things of life, or to train them in order that they may get the most out of life, or to give all-around self-development without much regard to what society needs, is necessarily a perversion of all sound educational theory.

The redistribution of human talent is a phrase which comes as near summarizing a sound educational policy as any single phrase can. Of course it requires further explanation and qualification. To redistribute human talent without regard to social needs would possess no merit whatever; but to redistribute it with respect to social needs is a summary of all the law and the prophets so far as education is concerned. The ideal which probably can never be attained, but which may be approximated, is such a redistribution of talent as to make each kind equally abundant with every other in proportion to the need for it. If we could bring it about that hand laborers were so scarce and business managers so abundant that the community would gain or lose about as much by the gain or loss of a single hand laborer as it would by the gain or loss of a single business manager, then we would have the ideal redistribution of human talent. Incidentally, of course, we should have an ideal distribution of wealth because one kind of talent would be approximately as well paid as another. As has been said before, this ideal condition can be approached, however, only by training men out

Education should redistribute talent.

of, or away from, those occupations where men are abundant into those where men are scarce.

Ignorance can hardly be defined in absolute terms. The barbarian, the savage, or the backwoodsman, possesses a wealth of knowledge which the modern academician lacks altogether. The unskilled laborer possesses a skill and technique which is unknown to his employer. He who possesses a kind of skill or technique which is over-supplied is called an ignorant man; he who possesses a kind of skill or technique which is undersupplied or scarce and in great demand is called an educated or a trained man. Ignorance is, therefore, a relative term. It means a lack of the kind of knowledge which is scarce relatively to the demand for it at the time and place under discussion.

Here again we must be on our guard and remember that it is always a question of more or less. More accurately, therefore, we should say that ignorance is a lack of that kind of knowledge of which society feels that it wants more than it has got. This may involve the possession of another kind of knowledge of which society does not feel that it needs much more than it has got. However much of this latter kind of knowledge a man possesses, he will still be classed as an ignorant man, and properly so, because he is not equipped with the kind of knowledge which would enable him to function as an indispensable or even highly useful member of society.

The indispensable man is the great man. The superfluous man is weak.

Generally speaking, he is the greatest man who happens to possess the kind of knowledge which makes him the most nearly indispensable to the rest of the community. In a military régime, the indispensable man is the man who knows how to manœuver armies so as to win victories. The presence or absence of such an individual may make all the difference between national

glory and national shame. One man more or less of the kind who knows how to fight in the ranks, or to handle the implements of warfare, may make very little difference. One man more or less who knows how to manœuver armies may make all the difference in the world. In an industrial régime it may easily happen that the captain of industry is one of the most indispensable of men.

He who can devise educational systems and educational methods which will increase noticeably the kind of talent of which there is a felt scarcity, and diminish the kind of talent of which there is a felt superabundance, is one of the greatest conservers of human energy that any country can possess. He deserves to rank ahead of the statesman, the business manager, or even the investor. Generally speaking, his work consists primarily in training men for skilled work who would otherwise be compelled to do unskilled work; for mental work who would otherwise be compelled to do physical work; for work requiring judgment and discretion who would otherwise be compelled to do routine work; for work requiring courage and initiative who would otherwise be compelled to work under direction. The reason for this is not that these so-called higher kinds of work are inherently superior to the others—it is simply because the supply of laborers in these so-called higher occupations is scarcer relatively to the need for them.

There is doubtless much bad distribution of wealth which is due to exploitation and injustice. The present writer will go as far as anyone in the effort to remove these causes of bad distribution. However, he is distinctly of the opinion that the bad distribution of wealth is mainly due to the bad distribution of human talent, and that the most constructive programme for improving the distribution of wealth is an

Exploitation and injustice account for much poverty, but not for all of it.

educational programme for improving the occupational distribution of human talent.

b. Social Values.

There is another sense in which ignorance is a great waster of energy. This may be called a kind of social ignorance, ignorance of real values, ignorance of the best methods of working together. One form in which this ignorance expresses itself is in the contrast sometimes drawn between human rights and property rights. It does not require a great deal of intelligence to see that all property rights *are* human rights. Things have no rights; human beings have rights in things. These rights in things are sometimes called "property rights." Where these human rights in things are clearly understood and wisely safeguarded, you have one of the most important factors in social prosperity. Wherever property rights are respected, there you find better conditions, other things equal, than you find in communities where property rights are not respected. Where property rights are respected you find conditions which attract people away from communities where property rights are not respected. Unless there be free land or great undeveloped natural resources, people do not migrate into a community where property rights are disregarded. Communities which are approximately of equal age, with approximately equal opportunities, can almost be classified on the basis of the efficiency of the protection of property rights. Where property rights are not respected and safeguarded, there is little prosperity, and the people, even the wage workers, to say nothing of the talkers, must leave such a community in order to find employment and go to another community where property rights are respected.

Property rights are human rights.

Instead of attempting to contrast human rights with

property rights, which is no contrast at all, there might be a real question as to the relative importance of human rights in certain kinds of property and human rights in certain other kinds of property; or human rights in property as compared with human rights that have no relation to property. These contrasts would present intelligible questions which could be discussed by rational beings. The other contrast cannot be discussed at all because there is no question stated.

c. Conflict.

Ignorance with respect to the nature of human conflict, particularly as to the nature of the different forms of economic competition, is responsible for a good deal of waste. Of all forms of human conflict, that which is known as economic competition is the highest. In no other form of conflict does success depend so much upon productivity or service, and so little upon destruction and deception. There are three kinds of economic competition,—competitive production, competitive bargaining and competitive consumption. Competitive production always works well, competitive bargaining sometimes works well and sometimes badly, while competitive consumption always works badly. Competitive production is, therefore, the highest form of economic competition, as competitive consumption is the lowest form, while competitive bargaining occupies a middle position. Competitive consumption has to do with private life rather than with business, therefore it lies outside the field of our present discussion.

Economic competition the highest and least wasteful form of conflict.

Competitive production.

We include under the word production any handling of materials which renders them more usable or useful. Even the retail mercantile house stores goods, thus add-

ing to their time-utility. It receives them in large lots, such as are convenient for the producer to sell, and hands them out in small lots, such as are convenient for the purchaser to buy, and, finally, it sometimes delivers goods to the customer, thus adding to their place-utility. All this is productive service. But, in rendering this service, it must buy and sell. Here skill in bargaining counts.

Competitive bargaining.

Many of the supposed economies of large scale business turn out, upon examination, to be advantages in bargaining rather than economies in production. If the large concern can control a source of raw materials and thus get them on more favorable terms than it will allow to its smaller rivals, it may beat the latter in competition, but its success is, in that case, due to superior bargaining power rather than to more efficient production. The large concern may succeed in getting better transportation rates than the small concern, but this is superior bargaining power rather than superior producing power. Again, it may be able to handle the labor situation in such a way as to gain an advantage in hiring its labor, but this is also a form of bargaining power rather than a form of producing power. Finally, the large concern may be able to maintain a better selling organization or to advertise more lavishly than a small concern. This, like the others, is an advantage in bargaining rather than in production.

Many supposed economies of large scale production are mere advantages in bargaining.

There is, in almost every line of business, a certain size which gives the maximum efficiency in production. How large the size should be depends upon a variety of circumstances of time and place. There is also a certain size which gives the maximum efficiency in bargaining, that is, in buying and selling, borrowing and lending. As a general

rule, the size which gives the maximum efficiency in bargaining is larger than the size which gives the maximum efficiency in production.

This has a very important bearing upon the problem of agricultural development. The most efficient producing unit is the one-family farm, that is, the farm which supports one family, and is cultivated by the labor power of one family. It should, of course, be a farm large enough to occupy the full working time of the family when equipped with the best teams, tools and general equipment which are available. Man for man, or in proportion to the total number of persons engaged, this is the farm which gives the highest average product; but it is necessary to distinguish sharply between product and profits. Under normal conditions, this type of farm will hold its own in competition with all others. But under abnormal conditions, it may be beaten out.

Where the large farm has some special advantages in securing a cheap supply of labor, such as slave labor, coolie labor, or masses of immigrant labor, the large farmer may beat the small farmer in competition. The latter, having to sell the product of his own labor in competition with the products of this cheap labor may be run out of business, or reduced to a condition of poverty. This, however, is an advantage in bargaining. They who work on the land sell their labor at so low a price, or, in the case of slaves, their labor costs the owner so little, that the large farmer may make a large profit in spite of the low average productivity of the persons engaged. The worst and most dangerous enemy of the small farmer, therefore, is he who tries to foist upon the rural districts a large supply of cheap labor. This is designed to give the large farmer an advantage in purchasing his labor. It will force the small farmer to sell

his own labor, or its products, in competition with that cheap labor, to his own impoverishment or extinction.

Again, in buying his supplies, in selling his products, especially if they be perishable, the large farmer usually has an advantage. Coöperation among small farmers, however, may give them those advantages in buying and selling which are otherwise the exclusive possession of the large farmer. The small farmers of the present day are the only large class which regularly buys its raw materials at retail and sells finished products at wholesale. In the borrowing of capital, likewise, the small farmer is usually at some disadvantage. This can be overcome by collective bargaining, or coöperation.

We need not indulge in any poetic rhapsodies over the small farmer. If he is inefficient, he must go. But we should be very careful to diagnose his case and find out where his inefficiency lies. It seems that he is efficient in production, but inefficient in buying and selling. This inefficiency can be overcome by the combination of many small and efficient producing units into one large and efficient bargaining unit. Organization, therefore, should be the watchword of the small farmers of the next generation.

Before leaving this subject of agriculture it ought to be pointed out that much of the advocacy of intensive agriculture is misdirected and calculated to waste human energy, that is, labor, while trying to economize land. It often happens that the most economical use of one factor involves a necessary waste, or uneconomical use of another. Where the one is dear and the other cheap, this is good economy. The intensive use of land means the application of so much labor and capital in its cultivation as to approximate the maximum product per acre. This involves, in nearly every case, a low product per man, or per

unit of labor employed in its cultivation. So generally is this the case that it is usually the rule, taking the world as a whole, that intensive agriculture and poverty go together. That is to say, wherever agriculture is carried to a high degree of intensivity one finds, as an observed fact, that the workers on the land are poor. The reason is not far to seek. Where land is so intensively cultivated as to bring it to its highest productivity it is because a great deal of labor is combined with very little land. This means that each unit of labor has very little land on which to work. An intensive use of labor requires that it shall have an ample equipment in the way of both tools and land. This will enable each unit of labor to produce its maximum. But when each unit of labor has an ample supply of land, each unit of land cannot have an ample supply of labor. As between the two, it is more important that each unit of labor should produce its maximum than that each unit of land should produce its maximum. In other words, an intensive use of labor is very much more important than an intensive use of land.

CHAPTER V

V. CONFIDENCE AND ECONOMY

Dependability, in a society of interdependent parts is of the highest utility.

Very closely related to the question of intelligence as an economizer of human energy is the factor of mutual confidence. One of the greatest factors in the economy of effort, otherwise called the saving of labor, is confidence. Its greatest value is not found in the stability which confidence brings to the financial market, though this is very important. It is even more important in its effect upon the foundations of the economic structure of which the financial market is the apex. Nor is its greatest value found in the unshackling of enterprise which results from confidence in the government, though this is of tremendous importance. So important is this that it is generally conceded by students that even a bad system of laws, provided they be enforced with certainty, regularity, and precision, may be better than a good system when enforced with uncertainty, irregularity, and lack of precision. In the former case, the citizen knows what to expect and can adjust his plans to the situation. In the latter case, he never knows what to expect, nor how to lay his plans. Of course, a combination of a bad system of laws with an irregular and uncertain administration is vastly worse; but the point is that confidence in the regularity and calculability of the government is of the utmost importance.

The average citizen has more points of contact with his fellow citizens than he has with the financial market or even

with the government itself, and the sum total of the dealings among individual citizens exceeds, not only in number but also in the sum total of importance, the dealings with the financial market and the government. It is in these multifarious relations between man and man that confidence assumes its greatest importance,— where its lack results in the greatest waste of effort, or its presence in the greatest economy.

Professor E. A. Ross in his book on *The Changing Chinese* mentions certain parts of China where the owner of a rice field must guard his crop every night to keep the crop from being stolen. The waste of energy involved in this process must be tremendous. Unless we have at some time been confronted with the same necessity, we can scarcely appreciate how much energy we save through being able to sleep at night in confidence that the products of our labor will not disappear before morning. But before we waste much sympathy on those Chinese farmers, we should consider the position of the fruit grower and the market gardener in the neighborhood of our large towns. Unless one is able to produce on a scale sufficiently large to permit one to hire a watchman, or unless one is very favorably situated with respect to police protection, one is at the mercy of town marauders. This injures the town consumers as well as the country producers, because it adds to the cost of growing fruits and vegetables, and the town consumer must share in the cost. The sheep grower has his troubles also with the sheep-killing dog, which adds to our cost of living by discouraging sheep husbandry. Until we can create conditions under which every farmer can go to bed at night in serene confidence that his property will not be stolen or destroyed before morning, we shall not achieve the maximum economy of effort.

But more important than safety from theft or destruction is that confidence of neighbors in one another which will enable them to work together for their common good. One of the greatest hindrances to coöperation is the lack of confidence which neighboring farmers feel in one another. The present writer has talked with and to many hundreds of farmers on the subject of coöperation. He has found very few who doubted that it would be a good thing; but when he has tried to find out why they did not coöperate, he has generally found that it was because of a lack of confidence in one form or another. Sometimes this lack of confidence is due merely to a feeling of uncertainty as to just how to begin. We are all afraid of the water until we have been in often enough to feel certain that we know how to swim. This lack of confidence should, perhaps, be called caution, which, up to a certain point, is a good thing. Frequently, however, it is due to a sheer lack of confidence in the integrity or good will of one's neighbors. Where this lack of confidence is justified by such lack of integrity or good will there is need of a moral or religious reform. The reformer who would create integrity, reliability, and good will where these qualities do not now exist, should be ranked with the mechanical inventor or the engineer who devises labor-saving methods. Nothing could economize labor more effectively than the creation of these moral conditions which would enable the neighborhood to work together rather than at cross purposes. In some respects, a neighborhood may be likened to a large and highly complicated machine. If the various parts are not working in harmony but are banging against one another, there is a great waste of power and efficiency. It would not be stretching the meaning of terms very much to say that a highly immoral condition existed within the machine. In the social

organism, the harmonious working of parts is the essence of morality, and, conversely, the inharmonious working of parts is the essence of immorality. It is obvious that the coöperative organization of rural communities, so much needed for agricultural efficiency, is not to be created by merely saying "Go to now: let us work together." There can be no effective coöperation where there is no mutual confidence: there can be no mutual confidence where there is little integrity, reliability, or good will. In a community where every man's word is as good as his bond, where every neighbor can be relied upon to do his part faithfully in the upbuilding of the community, and where there is a neighborhood pride and patriotism and mutual good will among all the neighbors, there will be no difficulty in working together, which is the essence of coöperation.

CHAPTER VI

VI. THE STANDARDIZATION OF GOODS AND OF CONDUCT

Closely allied to honesty and the calculability of conduct is the subject of standardization. When human conduct can be so standardized as to remove all suspicion and all necessity for watching our neighbors, we can each proceed with our own work with less fear and distraction than are now forced upon us. The economies which result from standardization are perfectly apparent in the case of material goods.

[1] Whatever differences of opinion may exist with respect to other functions of government, little is said or to be said against coining money and fixing the standards of weights and measures. Though these two functions are grouped together in the same clause of our federal constitution, it is doubtful if it is generally realized how close is the logical connection between them. Both result in great economy of effort in the transfer of goods. The economy involved in transferring coined money rather than uncoined metal is apparent. Coining the metal merely enables it to pass from hand to hand without the labor of inspection, that is, without weighing it to determine its quantity and without testing it to determine its quality. It "sells"—if we may speak of selling money—on grade and reputation rather than on inspection. It is the most salable of all commodities, and the fact that it is so standardized as to make inspection unnecessary on the

Standardization and economy in marketing.

[1] Cf. article on standardization in marketing by the author in the *Quarterly Journal of Economics*, February, 1917.

part of the "buyer" has a great deal to do in giving it its superior salability. By the same process of standardization, any other commodity may approach gold coin in salability, though it may not quite reach it. At least it is safe to say that whenever it can be sold entirely on grade and reputation, and absolutely without inspection, its salability will be enormously increased.

A short step is taken in the direction of standardizing other commodities when the State establishes uniform standards for determining quantity, that is, when it fixes the standard of weights and measures. Without some uniform system even our present methods of selling would be much more clumsy and wasteful. Every buyer would have to have his own system for determining the quantity of his purchases. This falls short, however, in two important particulars, of what is accomplished when metal is coined in a modern mint. In the first place, the government actually coins the money or requires it to be coined according to its own rules; whereas in other cases it only defines the units of measurement and commands conformity to its definitions. In the second place, coins are standardized, not only as to quantity, but as to quality as well. There is no probability that any government will be called upon to do that which would be analogous to coining money—actually put up other commodities in standardized packages. Something is to be said in favor of fixing standards of quality as well as standards of quantity.

Standards of quality as well as of quantity are needed.

The reasons in favor of fixing standards of quality, wherever it can be done, are identical with those in favor of fixing standards of measuring quantity. They are all summed up in the superior economy of buying on grade and reputation as compared with buying on inspection. The buyer of an unstandardized com-

modity may have enough confidence in the sellers' system of weights and measures to avoid the necessity of weighing and measuring for himself; but he can scarcely avoid the necessity of inspecting the commodity in order to determine its quality. In some cases, the determination of its quality is easier than that of its quantity, but in other cases it is not. In all cases where quality can be standardized, there is economy of effort. So far as buyers can be saved the trouble of inspection, so far will they be enabled to economize the time and effort involved in making purchases, and so far, also, will the salability of commodities be increased. Whether this will reduce the cost of getting the standardized commodities from producers to consumers or merely enable the consumers to use their time more advantageously to themselves, may be open to question; but the ultimate economic effects are much the same in either case.

Not the least among the advantages of a minute division of labor is the fact that each individual can avoid the necessity of being expert in many things and therefore has time to become a specialist in one thing. One of the advantages of the standardization of commodities is that the average consumer can avoid the necessity of being an expert judge of the many articles which he has to purchase. He may therefore utilize his time and mental energy in his own special field of work. There is, to be sure, something attractive in the custom of the well-to-do burgher going to market and selecting with the eye of a connoisseur the various articles needed by his household; but it is wasteful of time and mental energy. When he or his housekeeper is able to order by telephone, without any inspection whatever, and still get what he wants, more time is left for other things.

This will help to explain two very distinct tendencies in present day retail marketing methods. The first is to put more and more articles up into standardized packages. The second is to place more and more dependence upon the retailer, who, in many cases, is coming to regard his customers as clients to whom he is bound to give his own expert service. Both tendencies are designed to save the consumer the trouble of becoming an expert buyer. Neither tendency has, as yet, reduced the cost of getting products from producer to consumer. If the consumer utilizes the time saved in earning a larger income with which to purchase goods, it perhaps does him as much good as it would if these tendencies merely reduced the price of commodities.

One reason why these tendencies merely save the time of the consumer rather than reduce the cost of getting the products to him is that the standardization takes place only in the last stage of the process, that is just before the commodities reach the consumer. In order to reduce materially the spread between the price which the producer gets and that which the consumer pays, standardization must take place early in the process. This will enable the standardized article to go through the channels of trade at a lower cost. If it has to be inspected every time it changes hands, the process is expensive and someone must pay the cost. Some products apparently cannot be standardized, and there must therefore always be a wide spread between the producers' and the consumers' prices.

Standardization should take place early in the process of marketing.

A good illustration of the effect of standardizing a product early in the process of getting it from the producer to the consumer is found in the marketing of California oranges. They are graded and standardized as soon as they leave the orchards, all subsequent inspection is therefore unnecessary, and the cost of getting

them to the consumer is reduced practically to the physical cost of haulage and handling. This has notably reduced the spread between the two prices. Many other commodities, such as wheat, cotton, pig iron and coal are largely sold on grade rather than on inspection. In these cases, the government has very little to do with the standardization. Two recent acts of Congress, however, have brought the government definitely into this field as the fixer of standards of quality. These are the Cotton Futures Act and the Grain Standards Act. Both give the Secretary of Agriculture power to establish grades and to enforce their use in the regular channels of trade. A number of States also have passed grading laws of various kinds. Four New England States have passed a uniform apple grading law, defining the contents of a standard barrel, describing the various grades of apples, and imposing penalties upon all departures from the standards prescribed.

Such legislative acts cannot be called in any true sense interferences with trade. They are designed to increase the freedom with which commodities may circulate. They are somewhat analogous to the work of the traffic policeman on a crowded corner. He may exercise authority and interfere occasionally with an individual's movements; nevertheless, the result of his so-called interference is greater freedom of traffic.

CHAPTER VII

VII. VICE AS A SOURCE OF WASTE

The subject of vice has not generally been considered as a subject for the economist, but has been reserved mainly for the moralist. If vice could be defined in such a way as to divest it of all economic significance, this might be a justifiable neglect. But we should not then have a rational conception of vice. Vice is, after all, nothing in the world except waste of human energy. Nothing is vice except that which wastes or dissipates human energy, and everything is vice which does waste or dissipate human energy. This brings vice definitely within the scope of the economist's study. So-called vice, that is, conduct which is condemned by the conventionalities of society, but which is harmless in itself in the sense of causing no waste, is merely evidence of social ignorance as to the real content of vice.

Vice is the dissipation of human energy.

Of all vices there is probably none which is so wasteful as drunkenness. Therefore, there is probably no vice which is so reprehensible from a rational point of view. There may be people who would dispute this and insist that there are other forms of vice which are more odious to themselves than drunkenness. However, if the question were put to them in a practical way, they would probably agree without knowing that they were agreeing to this proposition. If they were compelled to choose between riding behind a locomotive engineer who was addicted to drunkenness, and one who was

In our interlocking civilization, drunkenness is probably the most destructive of all vices.

addicted to any other vice, which would they choose? If they were compelled to choose between a chauffeur who was addicted to drunkenness and a chauffeur who was addicted to any other vice; between switch-tenders, train dispatchers, bank-cashiers, drug-clerks, or men in any other position of responsibility in our interlocking civilization who were addicted to drunkenness, or those who were addicted to any other vice, they would not hesitate as to the choice. In our moments of high spiritual exaltation, especially if we are in a talking mood, we may express more hostile opinions regarding wrong views on baptism, or predestination, or sexual virtue, or profanity than against drunkenness. But in our practical choices we make no such mistake.

One of the most hopeful signs of the times is the way in which the great mass of the serious, thinking people, though perhaps somewhat commonplace in their views, are taking hold of this problem. No movement of popular opinion of the present day has shown such steady, consistent and widespread acceleration as the prohibition movement. Though it is opposed on the one hand by many of the so-called intellectually élite, and on the other hand by the so-called radicals in a social and political sense, still the great mass of the common people who are neither intellectually gone-to-seed nor windy radicals, are definitely for it.

The fool-killer is necessary, but he should work with accuracy and precision.

There is, of course, something to be said in favor of a fool-killer which would eventually tend to rid the world of those unstable natures who succumb to the temptation to vice. Where the vice is one which affects the vicious individual alone, or even mainly, the argument is overwhelmingly in favor of allowing individuals free access to that form of vice; but a vice which so quickly destroys the individual's responsibility

and his fitness for functioning in our interlocking civilization as does alcohol, is quite as likely to be a killer of the wise abstainer as of the unwise indulger. No one is safe where men in all sorts of responsible positions become so habitually irresponsible as do those addicted to the vice of alcohol. The restricting of this vice, or the closing of opportunity for it, is, therefore, as much for the protection of the strong members of society who can resist temptation as for the weak members who cannot.

One of the great dangers of modern society is the growth of a maudlin sentiment in favor of weakness rather than in favor of strength. What is sometimes called "the cult of incompetence" is becoming practically a religion with some people. Men cannot resist temptation; therefore temptation must be removed from them. Men cannot be self-supporting; therefore a State must care for them. This is sometimes called a "paternal" State. It should rather be called a grandmotherly State. To protect weakness against itself is to cherish weakness—to bid it be fruitful and multiply. To compel strength to sacrifice itself in the interest of weakness, beyond certain rather definite limits such as are involved in the domestic relations, is to discourage strength, especially if we show a positive antipathy toward the success which comes of strength.

CHAPTER VIII

VIII. PRODUCTION VERSUS PREDATION

So much has been written in a demagogic vein about "big business" that the idea is gaining ground that bigness is a crime. This is in line with another popular idea, namely, that it is the duty of the government to protect the weak against the strong.[1] In a crude and primitive society it might, perhaps, have been assumed that the strong man was able to take care of himself and that it was only the weak man who needed protection. It is to be hoped however, that civilization has advanced beyond this primitive state. Even the strong man may find it cheaper to pay taxes for police protection than to try to furnish his own protection. Even the weak man may need restraint as much as the strong man. If there is anything which modern psychology has proved, it is that the average criminal is weak rather than strong. He is mentally defective, incapable of taking care of himself and unable to control himself—therefore, he must be controlled by the State.

To protect the weak against the strong is a mistaken policy.

In short, it is high time that we stopped talking about protecting the weak against the strong. That is quite as absurd as the opposite idea usually fathered upon the late Frederick Nietzsche, that the strong should be given a perfectly free hand to rule and exploit the weak. It is time to begin talking about protecting production against predation. Whether

The producer must be protected against the predator.

[1] See the author's Essay in *Social Justice*, Chapter V.

the productive individual be strong or weak, the State must in its own interest protect him. Whether the predacious individual be weak or strong, the State must equally in its own interest suppress him. If the individual is in part a producer and in part preying upon other people, that part of his work which is productive must be protected and rewarded and that part which is predacious must be punished. The State need not give itself the slightest concern over the question as to whether he is weak or strong—that would be a silly question anyway. But the question whether his activities are productive or predacious is a matter of the utmost concern.

The more individuals there are producing and the more each one produces, the better it is for the State. The more there are preying upon other people and the more successful they are, the worse it is for the State. The more prosperous a man becomes through productive effort, the more prosperous he makes the State. The more prosperous he becomes through predacious effort, the more he subtracts from the prosperity of the State. The millionaire or the billionaire who has earned his millions or his billions is a benefit rather than a menace. The man whose wealth is measured only in thousands or even in hundreds, if he has not earned his thousands or his hundreds, is a menace rather than a benefit. In other words, the size of the individual's fortune need not give us the slightest concern. It is the way the fortune was accumulated, and that alone, which needs to be studied. The more millionaires there are in the country, the better off the country is, provided each millionaire has earned his millions. The only rational limit which ought to be placed on the size of a man's fortune is the limit of his actual earnings, and that limit cannot be named.

The best way of estimating the value of a man or his

earning power is to find out how much he would be missed if he were to stop working, or emigrate, or, more accurately, how much worse off the community would have been if he had never worked. How much less would the community produce without him than with him? If that would make a difference of about a dollar a day in the total production of the community, then he is worth about one dollar a day. If it would make a difference of one thousand dollars a day, then he is worth one thousand dollars a day.

How much would a man be missed is a rough test of his value.

How much an individual is worth in the community, or how much he would be missed if he were to leave the community, depends to a considerable extent on the question of how many other men there are just like him who are able and willing to do the kind of work which he is doing. If there are thousands of other men ready to take his place and do the work just as well as he can, obviously he is not worth much and the community could get along almost as well without him as with him. If there is no one else who can do the work quite as well as he, and the work itself is quite important, then the community would miss him if he were to leave. In other words, he is worth a great deal. This, of course, is not very flattering to men of the former type. They can outvote the men of the latter type and if they are foolish enough to be deceived by political claptrap, they are very likely solemnly to vote themselves to be the real producers of the wealth of the country and to call the other man a parasite.

This would be about as wise as the policy of the old woman who threw clubs at her chickens because they were shy and would not come when they were called. If there is a kind of work which it is very important that the community should have done, and there are only a few who are capable

of doing it, two things are fairly obvious: First, those few will be well paid, because each one is very much needed, Second, there ought to be more such men in that community if they could be found or persuaded to train themselves for that kind of work. The way to encourage men to train themselves for that kind of work is to pay them well for it and honor them besides. The way to discourage them and to make such men still scarcer is to denounce them and call them parasites. If there is another kind of work for which there are thousands of capable men ready, however important that work is in itself, no individual among those thousands is worth very much, that is, any one of them can be spared with no great loss. If a certain number of these men could be persuaded to train themselves for the other kind of work for which men are scarce, the community would gain. It would lose a certain number of men from an occupation where men were over abundant and from which they could easily be spared and gain an equal number in an occupation where they were very much needed and where each addition was a great gain to the community. The way to encourage men to make this transition is to pay them low wages in the overcrowded and high wages in the undercrowded occupations. But while the men in the overcrowded occupation are in a weak position economically, they are in a strong position politically in that they can outvote the men in the undercrowded occupation. They are, therefore, under a strong temptation, if they are improperly led, to try to vote themselves favors and to vote against the interests of those in the undercrowded occupation.

CHAPTER IX

THE INVESTOR

The writer desires to emphasize still further what he has already said with respect to the investor. He is convinced that the most needed men at the present time in our industrial system are the wise investors. An investor is merely one who buys producers' goods instead of consumers' goods. He who spends a dollar or a million dollars for consumers' goods virtually turns the productive energy of the community toward the production of consumers' goods to the extent of his purchase. He who buys tools to the extent of a dollar or a million dollars, similarly turns the productive energies of the community toward the production of tools to the extent of his purchase. Provided he was wise in his choice of tools, the world is a great gainer because of his purchase. That is to say, if he selects for purchase the kind of tools which are needed to set labor to work and to provide the necessaries of life, the investor is a great benefactor. If he is unwise in his choice, that is if he purchases tools which are not needed and cannot be profitably used, he is a waster of the energies of the community. Nothing can be more important, therefore, than that there should be a good many wise purchasers of tools, that is, wise investors. The more such men there are and the wiser they are, the more rapidly will our industries expand, the more employment there will be for labor, and the higher the laborer's wages will be. The fewer such investors there are and the less wise they are, the less will

The wise investor is an economizer at the source of all economy.

our industries expand, the less employment there will be for labor, and the less well will our people be supplied with the necessaries of life. Because there are so few really wise investors, and because so many more are needed than we have got, the few who are really wise in their purchases of tools become very prosperous. The cure for this is obviously not to attack them and make them still scarcer, but to encourage them and make them more abundant.

That the labor power of the community should be directed into those channels of production where it is most needed and where its productivity would be highest, is too obvious to need much discussion. To allow a part of the limited supply of any factor to be used for a less productive purpose when it might be used for a more productive purpose is only a little less wasteful than to allow it to remain unused altogether, or to be destroyed absolutely. For purposes of illustration, let us take the case of an irrigation project where there is more land to be irrigated than can be irrigated with the limited supply of water. Let us also think in terms of the whole community and its growth and prosperity rather than in terms of any individual or group of individuals and his or their prosperity. The problem would be so to use the limited supply of water as to produce the maximum supply of the products needed or demanded by the whole community.

Assuming that all the water available is stored and utilized in irrigation, four particular forms of waste would have to be guarded against. In the first place, there would be the possibility of using some of the water on poorer land while better land was left without water. To use water on land which would yield only twenty-five bushels of wheat per acre when it might have been used on land which would yield fifty bushels per

Irrigation water may be used ineffectively unless it is conserved.

acre would be exactly as wasteful as to allow half of it to run away unused and use the other half on fifty-bushel land. In the second place, there is the possibility that some of the water should be used in growing a less valuable crop when a more valuable crop might be grown. To use water in the growing of a crop which is worth only twenty-five dollars an acre when it might have been used in growing one that would be worth fifty dollars an acre is, again, exactly as great a waste as to let half of it run away unused and use the other half on the fifty-dollar crop. Reservations must be made, of course, in favor of less valuable crops, when evaluated under a short-sighted policy, which under a far-sighted policy, are seen to be valuable for purposes of rotation and the preservation of soil fertility. Other reservations must be made against crops which are valuable because of a popular demand, when superior wisdom would pronounce the demand to be vicious. In the third place, there is the possibility that some of the water should be used by a less skillful farmer when it might have been used by a more skillful farmer. Continuing our comparison: To allow water to be used by a farmer who can only make it produce twenty-five dollars worth of stuff when it might have been used by a farmer who could make it produce fifty dollars worth is exactly as great a waste as to allow half of it to run away unused and allow the other half to be used by the fifty-dollar farmer. In the fourth place, and this is the greatest danger of all, there is the possibility that certain fields will receive so much water as to make the marginal productivity of water low, while others receive so little as to make the marginal productivity of water high. In such a case the total product of the community would be increased if the water could be more evenly distributed between these two classes of fields.

Marginal productivity is a term perfectly well understood by academic economists, but not in current use among the laity. When applied to the use of water on a given irrigated field, it means the additional crop which results from the last inch of water used, over and above what would have resulted if one less inch had been used. If, for example, forty-eight inches are used on a given field, how much larger crop will be grown than would have been grown if forty-seven had been used? Or, if forty-eight are used on one field, and forty-seven on another in all other respects alike (if that can be imagined), how much more will be grown on the one field than on the other? Now there is a limit to the quantity of water which can be advantageously used on a given field. Let us assume that on the irrigation project which we are now discussing, seventy-two inches is the maximum quantity of water which can be advantageously used on any of the land. Seventy-one inches would be almost as good as seventy-two; that is, the difference in the product would scarcely be perceptible; whereas seventy-three would produce actually less, though very little less, than seventy-two. At this point, the marginal productivity of water is very low, practically nil. That is to say, the fields that are receiving seventy-two inches of water yearly would produce practically as much with seventy-one inches, and if they were cut down to sixty inches it would not greatly reduce their productivity. Suppose, however, that there were other fields for which there were left only forty-eight inches. This quantity is so small that the land only yields half the crop of which it is capable. Twelve inches more would make a great difference. Then it would be more economical to cut down to sixty inches the quantity on the land which had formerly been getting seventy-two inches, in order that the land

which had formerly received only forty-eight might be raised to sixty likewise. If this would reduce by ten bushels per acre the crop on the land which had been getting seventy-two inches of water, and increase by twenty-five bushels the crop on the land which had formerly received only forty-eight inches, there is a gain of seven and a half bushels per acre on the average of both classes of fields.

How can these forms of waste be prevented? The farmer with the poor land wants water just as badly as the farmer with good land and will clamor just as loudly for it. The farmer who is growing a less valuable crop wants water as badly and will clamor as loudly as the farmer who is growing the more valuable crop. And especially is it true that the unskillful farmer wants water just as badly and will clamor as loudly as the skillful farmer. Finally, the farmer who is getting sixty inches of water, if he is convinced that seventy-two inches would increase his crop by ten bushels per acre, will be quite anxious to get that extra twelve inches. He is likely to be less concerned over the increase of the average crop of the community by seven and a half bushels per acre, than over the increase of his own crop by ten bushels per acre.

If these various controversies were to be settled by any kind of political action, or by commissions or arbitration boards, there is no certainty that the owners of the poorer land or the growers of the less valuable crops would not command more votes and therefore get more consideration than the owners of the better land or the growers of the more valuable crops. Since unskillful farmers always outnumber the skillful, and are generally poor while the skillful are rich, there is almost a certainty that the former could outvote the latter, and create more

Administrative distribution of water is cumbersome.

general sympathy besides among the non-agricultural classes. The only one of the four forms of waste which any kind of political control would be likely to prevent would be the last; but even this would be uncertain. A political or popularly controlled board or commission would almost of necessity be compelled to decide in favor of an equal number of inches for all lands. This would work well enough if it were true that all lands required equal quantities of water, or that the marginal productivity of water were equal on all lands. This is by no means true, and in case it is not, this rough and ready rule of equality would prove to be uneconomical. That is, the probabilities are that some land ought, in the interest of a larger product for the whole community, to have more water than the other land. The same may be said of men. Some men know how to use water more productively than other men. In the interest of the maximum production for the whole community, those men who can use water most productively should have it, or, at least, have more of it than others.

The argument may thus be summarized by saying that the available supply of water should go into the better rather than the poorer land, should irrigate more valuable rather than less valuable crops, should be used by more skillful rather than less skillful farmers, and that it should be so distributed among the various fields, crops and farmers as to give it approximately the same marginal productivity wherever it is used. If one field, crop, or farmer is getting so much water that a little less would make very little difference, while another is getting so little that a little more would make a great difference in the crop, then the water should be redistributed so that one inch more or less in one place would make as much or as little difference as it

would anywhere else. How can some approximation to this result be secured?

In parts of Spain, as well as in other countries where irrigation has been practiced for thousands of years, a certain portion of the irrigation water is sold at auction or by some form of competitive buying. It would be too much to say that this method prevents all the forms of waste which have been mentioned above. That is too much to say of any system or plan which man devises or operates. It is probable, however, that this method comes as near eliminating waste, or securing the maximum economy of water as any method that has ever been devised, or is likely to be devised very soon. When water is sold to the highest bidder, the cultivator of good land can, other things being equal, afford to pay more for it than the cultivator of poor land, the grower of a more valuable crop can pay more for it than the grower of a less valuable crop, the skillful farmer can pay more for it than the unskillful farmer, and the farmer whose crop would be greatly benefited by a little more water can pay more than the farmer whose crop would only be slightly benefited. Since each unit of water should go where its productivity would be greatest, and since the highest price can be paid without loss on the investment by the one who has the most productive use for it, it follows that the water ought to be distributed to the highest bidders, assuming, still, that the purpose is to secure the largest total crop for the whole community. No other method or system has ever been invented, even on paper, much less put into successful operation, which comes so near the realization of the highest economy of water as this time-honored method.

Competitive purchasing has its drawbacks, but is economical.

The principle involved here is very much the same as in the European versus the American plan of dining at a hotel.

The American plan, where the guest pays a fixed sum and then eats whatever he wants, is notoriously wasteful. The European plan is more economical of food, though it sometimes leads thrifty or impecunious persons to take insufficient nourishment. When the farmer pays a fixed sum for water, he is likely to use it somewhat uneconomically unless he is closely supervised by some public authority. Where he pays for just what he uses, it may sometimes lead to over economy. The choice, therefore, is between administrative supervision on the one hand and competitive buying of water on the other, as means of preventing the wasteful use of water.

This rather long illustration has been used for two reasons. In the first place, the buyer of irrigation water is an investor in the strictest sense. He buys a productive agent in the expectation that the sale of its product will recoup him for its purchase price. Moreover, the price which he is willing and, in the long run, able to pay for the productive agent, is determined by the anticipated value of the product. In the second place, water is tangible and its productivity in a dry country verifiable: more water, more crop, less water, less crop. No irrigation farmer is ever bothered by quibbles as to whether water is productive or not. The perception that an increased crop follows an increased application of water furnishes him as good a theory of economic causation he needs in his business.

Productivity of water not likely to be questioned.

Every investor is the purchaser of productive agents of one kind or another. His inducement is the hope that he may sell the products for enough to recoup him for the purchase price and leave him a surplus besides. If the product does not materialize or prove as valuable as he had anticipated, he loses rather than gains. As with water, so with every other productive agent: It

Every investor is a purchaser of productive agents.

is for the interest of the community as a whole that it shall be used as productively as possible. Society is injured whenever any agent of production is used less productively when it might be used more productively, whether the agent in question be water, mowing machines, steel rails, or labor.

The purchasing of labor to be used in the cultivation of land bears a pretty close analogy, so far as our present discussion is concerned, to the purchasing of water to be used in the irrigation of land. Certainly, all four forms of waste are found here, and need to be guarded against. The maximum productivity is secured only when it is used upon better rather than upon poorer land, in the cultivation of more valuable rather than less valuable crops, when it is directed by more skillful rather than less skillful employers, and when it is distributed among the various fields, crops and employers in such proportion as to give it approximately the same marginal productivity wherever it is used. On the last named point, another way of saying the same thing would be to say that the laborers of a given class should be so distributed as to make each one worth, where he happens to be working, as much as any other is worth where he happens to be working. Or again, if it can be said of any one of them that his productivity would be greater if he were removed to another farm, to another crop, or put under another employer, then the labor force is not being utilized with the maximum economy. One reason why a given laborer may be uneconomically employed would be that there are too many others like him working on one farm, while too few are working elsewhere. A better distribution of the laborers, so that none of them could be moved advantageously to other employment, would give the highest advantage.

Hiring labor and buying water are somewhat similar operations.

How can this advantageous distribution of the labor

supply be secured? Not by boards or commissions, apparently, but by the time-honored process of competitive bidding. Let each laborer work for the employer who can pay him the most, and the chances are that he will find the place where his productivity is the highest. Of course it cannot be said that this is absolutely certain. Nothing in this world is absolutely certain except death. It is a question of a greater or less approximation to certainty. No other method has yet been devised which, even on paper, approximates so nearly to certainty. The farmer with good land can, other things being equal, pay more for a given quantity of labor, or the same for a larger quantity than the farmer with poor land, for the simple and sufficient reason that labor is more productive on good than on poor land. The farmer who is growing a more valuable crop can, other things being equal, pay more for labor than the farmer who grows a less valuable crop. The skillful farmer can, other things being equal, pay more for labor than the unskillful farmer. And finally, the farmer who is under-supplied with labor can, other things being equal, pay more for *additional* help than can the farmer who is over-supplied with labor. In fact, the former can afford to hire a fragment, more or less large, away from the latter because the former can pay such a price for it as would cause a loss to the former if he continued to hire it at that price.

Competitive hiring of labor likely to be economical from the social point of view.

All investments are fundamentally alike in these respects. They consist in buying agents or instruments of production and directing them into special fields of production. All investors are therefore automatically charged with the responsibility of preventing the productive energy of the community from going to waste. To turn any kind of productive energy in the wrong direction is the one great

social waste involved in a bad investment. The mere fact that the investor loses his money is of no social consequence. The money is not lost to society unless it gets into the hands of a greater waster than the one who lost it. But if as a result of the bad investment, a lot of productive energy has been misdirected, or a quantity of labor has been misapplied, there is a fundamental, irreparable loss to society. For example, if one is persuaded into paying a vast sum of money for something which cost nothing to produce, and is of no use, there is very little social waste; but if one is persuaded to buy a million dollars worth of labor and to apply that labor in the production of something which is of no use, it is all wasted. To be more specific: If you are persuaded to spend a fortune on a gold mine that never existed, on which no labor has been spent or will be spent, somebody gets your money and you lose it. Society has lost nothing unless the other man will use your money even more wastefully than you have done. But if you are persuaded to spend your money hiring laborers at great expense to dig a hole in the ground seeking gold when there is no gold there, or digging for brass as was actually said to have been done by an Ohio woman, all that labor is wasted. It should have been used in producing something that would have benefited society. If you are such a poor investor as to misuse your power in that way, it is to the advantage of society that you be put out of the game, that you lose your power of investment, that is, your power to misdirect and waste the productive power of the community; in short, that your money be taken away from you. The more speedily you, and others like you, can be eliminated the better, because the more bad investors there are like you, the larger the proportion of the productive energy of society which will go

A bad investment almost the most wasteful thing short of absolute destruction.

to waste in futile and unproductive work. The smaller the proportion of such bad investors the less the fund of energy which will thus go to waste.

Another point to be observed is that one of the functions of the investor is to act as a shock-absorber or an insurer of society against waste. The fund which you invested, in the foregoing illustration, has been put up as a kind of insurance fund to recoup society for the loss of the labor power which you misdirected. Whether it be a hundred dollars or a million dollars which you have used to purchase labor for unproductive work the shock of its loss falls upon you primarily; whereas before the investment you possessed a fund of value, after the investment you possess it not. It has gone to replace the waste which you have occasioned.

There are two very strong reasons why the direction of investing should be left primarily and mainly to private investors. Investing is competitive bidding for the productive energy of society. In this process of competitive bidding, they who direct the energy of society most productively win and stay in the game; they who direct that energy least productively become bankrupt and are eliminated, leaving the direction in the long run in the hands of the more efficient directors, or those who have managed in some way to make the productive energy which they have directed produce more than it has cost. There is no automatic method or any other method that has ever been devised by means of which men in a government office, working on a salary, can be thus selected for the direction of the productive energy of society. In the first place, since such public officials would not be investing their own but other people's money, they cannot act as shock-absorbers or insurers of society. They put up nothing with which to recoup society for the loss occa-

Investing is competitive purchasing of productive power.

sioned by their mistakes or their misdirection and misapplication of the labor power of the community.

A great deal has been said about the genius of the inventor, the man who devises mechanical improvements which add to the productive power of the community. Some men seem to have a genius for invention; and it would be difficult to calculate the benefits which they have brought to society. They receive the plaudits of mankind as they deserve. We sometimes think, however, that it is unfortunate that they do not themselves reap pecuniary rewards commensurate with their contributions. We have not often stopped to ask ourselves what would have happened if large funds of wealth had been put into the hands of these men who have a genius for invention but who, in some cases at least, have lacked the genius for investment. If they have lacked a genius for investment it means that they would have spent their wealth in such ways as to waste the productive energy of society. Whether this productive energy is misdirected by a saint or a sinner, a genius or an imbecile, makes very little difference. Waste is waste. The productive power put into the digging of a hole in the ground is thrown away as absolutely if it is directed by a scientific inventor as it would be if directed by a superstitious old woman.

Some men have a genius for inventing, others for investing.

Comparatively little has been written about the genius of the investor, for some men have a genius for investment. They seem to know almost intuitively the difference between an expenditure of productive energy which will be highly productive and an expenditure which will be less productive. The more such geniuses any country can produce the more productively will the energy of that community be directed; or, with a given quantity of this kind of genius, the more control over investment they can

be given, the more prosperous will the country become. If, therefore, there should be an inventive genius who is absolutely lacking in the genius for investment, it is rather fortunate for the community that he should be kept busy with his inventions and not be diverted from the field in which his genius lies into a field where he would be a bungler. On the other hand, if there can be such a thing as a man with a genius for investment who is absolutely lacking in genius for anything else, it is highly important that he should be kept busy with the work of investing capital and not be allowed to turn aside into some field where he would be a bungler. So much is almost self-evident.

The real question then is: How can we pick out the men who have a genius for investment? Going back to our illustration, how can we pick out the men who have a productive use for water and know how to use it productively? The only method is, the method of trial and error. They who succeed in the long run in making water produce abundantly will stay in the game; they who fail will be eliminated. In a larger sense they who succeed in the long run in so directing any kind of productive energy through their investments, that is, through their purchases of productive energy, as to make it highly productive will stay in the business; the others will be eliminated and forced into other fields where they cannot do so much damage, or possibly where they may prove to be highly efficient.

This whole argument is based upon the assumption that wealth is to be used for the purposes of further production rather than for the purposes of immediate self-gratification. From the standpoint of immediate self-gratification we may all feel, and probably do feel, and rightly feel, that the inventive genius has as much right to the immediate grati-

fication of his appetites as has the genius for investment. If our chief concern is, therefore, with immediate self-gratification, or the general use of wealth for gratification, then we might quarrel with this situation and hold that the inventive genius should be given more wealth than is given to the investor to use for his own pleasure; but if we hold that wealth should be used as far as possible for the purposes of further production,—for nation building,—for future generations—then we must agree that it is important that its direction should be in the hands of those who are most skillful in that work, who can pick out more skillfully than others the industries which need expansion and turn the productive energy of the community into their expansion; who can pick out better than others the locations for the new productive establishments and the men to superintend the detailed work of those establishments. We must agree that these men should have the power to determine the industries to be established, their locations, and the men who are to superintend them.

Investing the most delicate of all economic functions.

The work of investment is the most delicate and at the same time the most important of all economic functions. On the choice of the investor depends the whole question of the direction in which the productive power of the community is to be turned. A mistake on his part occasions greater economic loss than a mistake on the part of anyone else. A wise decision on his part brings greater economic gain than a wise decision on the part of anyone else. It is of the highest social importance, therefore, that power shall be given to him that hath this wisdom and shall be taken away from him that hath it not.

So far, this argument may seem to be an unqualified endorsement of the methods of big business, or a laudation of the successful man. It is, provided the big business is

genuinely productive and not merely acquisitive or predatory, and provided the successful man has earned his success by methods that enrich the community as well as himself. This is a very important proviso. We do not always distinguish as sharply as we should between efficiency in production and efficiency in bargaining. As applied to the question of the successful investor, we need to know very clearly whether his success is due to his wisdom in selecting genuinely productive enterprises, or to his ability to beat someone else in the bargaining process. If, for example, in his dealings with the inventor, he merely takes advantage of the latter's inexperience and swindles him out of his invention, the investor is not an investor at all. He is a swindler. The fact that the inventor was swindled merely proves that he was a poor bargainer, not that he was a bad investor. It is scarcely necessary to say that no social purpose is promoted by putting wealth and power into the hands of swindlers, or taking it away from poor bargainers.

This is not an unqualified endorsement of big business.

If you are a skillful bargainer and able therefore to buy a productive agent for less than it is worth, and sell its product for more than it is worth, you may succeed as a quasi-investor in spite of the fact that you are not directing the productive energy of the community in the most productive channels. There are many ways by which you may gain an advantage in bargaining which bears no relation to your skill or efficiency as an investor. The most conspicuous of these at the present time is monopolization.

The problem of monopolization is complicated by the fact that every monopoly must produce something useful or render some genuine service. The power of the monopolist, however, does not consist in the power to produce or render service. Others beside monopolists have that

power. The power of the monopolist consists essentially in the power to prevent anyone else from producing the same thing or rendering the same service. That and that alone distinguishes the monopoly from the business which operates under competitive conditions. This power to prevent others from producing the same thing or rendering the same service is always a destructive power. In these fundamental particulars every monopoly is essentially like that of the man who operated a ferry boat across a western river, and increased his business and his profits by using his Winchester to prevent anyone else from starting a rival ferry boat and to prevent emigrants from fording the river at low water. Running a ferry boat was genuine service. His use of his Winchester was disservice. His ferry boat added to his efficiency as a producer, but gave him no monopoly, his Winchester added to his efficiency as a bargainer. It was his Winchester which gave him his monopoly power. His investment in a ferry boat was a good investment both for him and the community. His investment in a Winchester was a disadvantage to the community, though it may have contributed for a time at least to his success. When a deeply conscientious band of emigrants paid him for ferrying them across the river and hanged him for not allowing them to ford the river, they had solved the monopoly problem in strict accordance with the principles of ideal justice.

Monopolization not investment.

This kind of discriminating logic needs to be applied in our judging the success of all investments. It is probable that no large success is achieved in this world without some elements of productivity or serviceability. Too frequently there is also a large element of bargaining skill as well. This is the reason that one is in great danger of being misunderstood by undiscriminating minds when one under-

takes to show that the investor has a real and very important function to perform. Nevertheless, and at the risk of being misunderstood, one must conclude that the community which manages to put great investing power in the hands of wise and skillful investors (not bargainers) will prosper out of all proportion to the community which keeps investing power out of their hands and puts it into the hands of mere vote-getters. The community where genuine investors are encouraged to exercise their skill, to profit by it, and to reinvest their increasing incomes is the community where production increases most rapidly, where the opportunities for other people expand most rapidly, and to which other people as well as investors flock in the greatest numbers. Even they who inveigh against the success which comes to investors in such a community very much prefer to live there and carefully avoid a community where investors have been held in low esteem or refused the opportunity to exercise their peculiar gifts.

The importance of the function of the investor in the economy of the productive power of a community is seldom fully appreciated. To understand this function thoroughly we should go back to some of the elementary facts of economics. In the first place, the investor is a buyer of producers' goods as distinguished from consumers' goods. The investors' market is a place where producers' goods are bought and sold in the same sense that the consumers' market is a place where consumers' goods are bought and sold. When many people are buying on the investors' market, it means that there is a great demand for producers' goods. The choice of the buyer is about the most elementary fact in determining the general direction of industrial development. If I have a dollar to spend and choose to spend it for confectionery, I increase the demand for con-

fectionery to the extent of a dollar and to that extent tend to call the productive energy of the community into the confectionery industry. Whether it be a dollar or a million dollars, the principle is the same. If instead I had decided to spend that dollar for millinery, I, to the same extent, should have called the productive power of the community into the millinery industry. If, instead of spending my money for confectionery or millinery or any other consumable article, I had chosen to spend that dollar for some kind of tool, say a spade, I should have directed the productive energy of the community into the tool-making or spade-making industry. When I choose to spend my dollar for tools rather than for consumers' goods, I become an investor. The more people there are who become investors, the greater the demand for producers' goods, and the larger proportion of the productive power of the community is turned to the tool-making industry, or the industries which build productive enterprises.

Luxurious consumption does not add to the employment of labor.

Carrying out the same method of analysis we see that a great deal depends upon the *kind* of producers' goods which I choose to buy with my dollar, or with my million dollars if I had that many. To invest in producers' goods that do not happen to be needed is not only to waste my money but to waste the productive power of the community. Money which is spent by investors for a given kind of producers' goods directs the productive power of the community into that particular line. And if the products are not needed, then all that productive power is gone to waste. An unskillful investor is therefore a very wasteful factor in society. Conversely, a skillful investor who makes no such mistakes, who always buys producers' goods which are needed, is one of the greatest conservers of human energy

which any community possesses. A genius for investment may be less spectacular than a genius for invention; but it is, if there is any difference among geniuses, the more important of the two. Unless investors are born and not made, we must assume that it is possible to train investors, if we can only discover the right educational method. A school of business which would really train, not only captains of industry, but successful investors, would probably do more for the conservation of the productive power of the nation, and also for the improvement of the wages and conditions of living of the laboring classes, than all the radical programmes of social reform that were ever invented.

Much can doubtless be done to prevent wasteful investment by legal restriction. Probably the so-called Blue Sky Law, if it can be made constitutional and be effectively enforced, is one of the most constructive pieces of legislation that have been enacted in this country since the legislation which came at the close of the Civil War. The facility with which unskillful investors are persuaded to waste their money in bad investments, seems to call for some kind of legislative protection. The kind of legislative protection which will protect these unskillful investors against the results of their own stupidity may seem somewhat sentimental; nevertheless, we cannot deny that a vast quantity of capital which might float into productive industries is thus squandered and misdirected, and that this misdirection not only wastes the money of the stupid investors (which is the least of the evils connected with it) but it tends to divert the productive power of the community into wrong channels, which is a matter of much more consequence.

Blue sky laws safeguard investors.

CHAPTER X

RATIONAL CONSUMPTION

From what has already been said regarding the power of the purchaser to direct the development of industry, it will be easy to infer that the purchasing habits of a community will have much to do with the economy of effort. To economize human effort in every other respect, that is, to organize industry on the most efficient basis possible, to eliminate wasteful conflict, and create widespread confidence, and do everything else to increase productive efficiency and do nothing to improve the consuming habits of the people, all may come to naught. What would it profit a community to be able to produce vast quantities of cheap and tawdry articles; to reduce to the lowest possible limit the cost of filling our bellies with the husks that were intended for swine, or to have all the tools and capital that could possibly be used in the production of articles that merely gratify ephemeral and sensual desires! If we once understand that with a well-organized industrial system we can have practically anything we want, then the great question arises, "What shall we want?" We can have as fine a country as we want if we are willing to pay the price, that is, if we are willing to give up some things which we may desire but do not need in order to have the things which make a great country. Any city can become as fine a city as it wants to become, provided its desire to become a fine city is sincere enough to make it willing to sacrifice the trifling interests which

Spending money for "that which is not bread."

interfere. The people of ancient Athens could doubtless have worn slightly more expensive clothing and eaten slightly more luxurious food for a good many years, if they had not chosen to adorn their city with those monuments which we now regard as the chief justification for the existence of that city. Because they chose rather to spend their money, that is, their time and energy, on these architectural monuments than on the pleasures of dress and the palate, Athens became a noble city. The people of the mediæval towns could doubtless have enjoyed for a considerable period of time slightly more expensive clothing and slightly more luxurious food, if they had spent their time and energy in producing these things rather than in producing those monuments to their religious faith which the western world admires but thinks it cannot reproduce.

So any American city, if it chooses to spend its time and energy on food and clothing, can enjoy for a good many years to come slightly more expensive clothing and slightly more luxurious food than it could have if it chose to spend that time and energy in the adornment of its streets, in the improvement of its sanitation, in the building of schools and libraries, art galleries, and other monuments to its intellectual life. If our people care more for bread and circuses than for anything else, then of course the productive energy of our people will be directed toward the production of bread and circuses. If they care more for permanent contributions to civilization, such as will justify their existence to future generations as the existence of the people of ancient Athens is justified to us, then the productive energy of the community will be turned in those directions.

Any community can pretty nearly have whatever it really wants.

Industrial efficiency will then be genuinely economical and need no further justification. This point of view is

so important that one can hardly be patient when thinking of the neglect which the subject of the consumption of wealth has suffered at the hands of most economists. However, while the economists may have neglected the subject, they cannot be charged with having actually perverted the subject as most other publicists and moulders of public opinion have been doing. Those half-baked economists who are sometimes contemptuously referred to as "magazine economists" pretty generally teach the doctrine that a lavish consumption of wealth is a good thing, especially for the laboring classes. They point out clearly enough that to spend money freely for articles of luxury tends to give employment to men in the luxury-producing industries. What they do not point out is that money spent on luxuries cannot be spent on other things; that it would give just as much employment to labor to spend money on architectural monuments as on millinery or "delicatessen." Or, to take a more commonplace illustration, it gives just as much employment to labor to spend money for tools, brick and mortar, steel girders and other building materials, together with machines and implements, as it does to spend money for immediate self-gratification. The difference, however, is that in the case of the expenditure of money for permanent things, society has something left to show for the labor which was expended, whereas if money is spent for ephemeral pleasures, there is nothing left to show for the labor which was used up in the production of these pleasures.

It is as important that the community shall want the right things as that it shall be productive.

The only sound conclusion which we can reach on this subject is that he who teaches the people to want the right things is as much a contributor to national greatness as is the man who organizes the industrial forces in the most efficient manner for the supplying of wants.

Lest room be left for the fear that lowering the standard of living may reduce the intensity and strenuosity of our work, it only needs to be said that the desire for a bank account or a life-insurance policy may enter into one's standard of living and be as effectual in stimulating one to high endeavor as the desire for beefsteak or caviar; or, that the desire for libraries, art galleries, parks and school buildings, which should occupy in the modern city an architectural position equal to that which the cathedrals occupied in mediæval cities, may be as great a stimulator to strenuosity as the desire for moving picture shows or ice-cream soda. And certainly, as already suggested, the money spent for these durable goods is just as effectual in giving immediate employment to labor as money spent for ephemeral goods.

Whatever supremacy we give to the merit of laying up treasures in heaven as compared with laying them up on earth, there can be no doubt that if we are going to lay up for ourselves treasures on earth at all, it is much better to build for future generations and an expanding civilization than to consume all our energies in the pleasures of the moment. This question we decide when we make our purchases; for, as said before, it is the direction of our purchases which determines the direction in which our energy shall be expended.

CHAPTER XI

CONCLUSION

From this outline it will appear that the word Economics covers much more than is commonly assumed. That truthfulness is a labor saving invention, or at least a great economizer of social energy may appear as a novel idea to those who have never thought of it before. And yet, nothing can be clearer. A lying community cannot work together effectively and must, in the long run, lose ground in competition with a community where general confidence prevails among the citizens. Respect for property rights works in the same way. Even they who oppose private property do not like to live in a community where property in some form is not secure. They would leave such a community, if for no other reason, because there would be no men of enterprise and business energy to support a population to whom they could preach against private property. Inherited property, on the other hand, is a source of waste in human life and energy in that it enables men to live without work who would otherwise have to work. On the other hand, it is doubtful whether men in the ordinary walks of life would work as hard to accumulate wealth, which is a great social advantage, if they could not leave a part of it at least to their heirs. From this point of view it is a means of economizing and utilizing energy. Does it occasion enough waste to overbalance this economy? This is the only phase of the question of inherited wealth which is worth discussing.

Why it is better to tell the truth than to tell lies.

It is to be hoped that enough has been said to convince some statesman or nation builder of the future that his one task is to frame such laws as will release all the available energy of his people and set it to work. Thus and thus only can a nation grow great enough and strong enough to be fit to survive. It is to be hoped also that some moralist will get a glimpse of the field which lies open before him. He who can so guide the moral development of the people as to make kinetic the energy which is latent among them, and direct that energy toward constructive work will deserve to rank among the nation builders. It is to be hoped also that some preacher of righteousness may see that nothing is righteousness except that which economizes and makes productive the energy of the people, and that nothing is sin except that which wastes or dissipates that energy. He who can harness the religious emotions of the people to productive work deserves also to stand among the nation builders. He may have also the consolation of knowing that in laboring for the building of a nation in which all the energy of the people is harnessed to useful work and none of it dissipated in vice, dishonesty, destructive conflict, luxury or distraction, he is in reality laboring for the building of the Kingdom of God.

Various types of nation builders.

INDEX

A

Abstinence, and the theory of interest, 129–131; and conservation, 151–152
Accidents, diminished, 222
Accruals, in conservation, 136–139
Adams, Frank D., "Our Universal Resources and the Problem of their Proper Conservation," 195, 250, 271
Adaptability to environment, as a feature of progress, 96
Adirondack Mountains, iron ore in, 244
Administration machinery, for public regulation, 179
Advertising power, of large concerns, 316
Africa, northern, ruins in, 81
Aged, utilization of labor of, 286–287; pensions for, 298–301
Agriculture, conservation in, 5, 7, 37, 169; productive unit of, 317–318; soil conditions in, 85; and land prices, 30–32; intensive, 30–32, 82, 110, 318–319; not subject to corporate action, 154; competitive bargaining in, 345. See also Dry Farming and Irrigation.
Alaska, coal-lands policy, 173.
Alcohol, as source of power, 206; prohibition of drinking, 329–331
Alexander the Great, dispersal under, 78
Altoona (Pa.), shops at, 84
Aluminum foil wasted, 84
American Association for the Advancement of Science, 17, 20, 24
American Economic Association, founded, 14–15; early publications, 15
American Institute of Mining Engineers, *Transactions*, 237, 272
American Mining Congress, 272
Amortization fund, for franchises, 176–177; for public equities, 178
Annapolis (Md.) function of school at, 13
Anophele mosquito. See Mosquito.
Antimony, high prices for, 83
Apples, waste in, 27–28, 31; standardization of, 328
Arbor Day, effect on conservation, 20–21
Arid regions, types of land in, 54, 62
Armenia, famine in, 38
Asia, populated from Greece, 78
Asia Minor, ruins in, 81
Athens, adornment of, 357
Atwater, W. O., cited, 86
Australia, rural credits in, 65–66; conservation policies, 166, 249
Automatic fire sprinklers, 88
Averages, law of, 141

B

Baltimore, shore lands in, 62
Banking, recent legislation in, 150
Barrows, David P., California land commissioner, 64
Beef-packers, methods, 70

Belgium, industrial opportunity in, 180; coöperation in, 307
Beneficiation for iron ores, 216–218, 225, 240, 244
Beneficial use, as a principle, 119
Berlin (Germany), Royal Statistical Bureau, 49
Big business, acts in a public capacity, 235; bargaining ability, 316; productive power, 350–351
Bisbee (Ariz.), copper ore in, 230
Black Diamond, 260
"Blue sky" legislation, 250, 355
Böhm-Bawert, *Positive Theory of Capital*, 129
Bonanza days, pass quickly, 103
Bonn, Prof. M. J., acknowledgments to, 12
Bowers, Edward A., "The Present Conditions of Forests in the Public Lands," 15
Brass foundry, reclamation in, 84
Briquets, made of coal, 198
British Coal Commission, 194. See also England.
Buffalo (N. Y.), food waste in, 38
Burrows, John S., discusses conservation, 195
Butler, B. S., cited, 227; "Copper," 271
Butte (Mont.), copper ore in, 230

C

Calculability of human conduct, 279
California, commission on colonization, 29, 63–64; report cited, 64–67; water-power policy, 173; fruit standardizing in, 327–328
Campbell, M. R., and Parker, E. W., "Coal Fields of the United States," 191, 194, 271; cited, 192–193, 198–199
Canada, intensive farming in, 82; economic history of, 103; conservation policies, 166; Commission of Conservation, 195, 250, 271
Canton (Ohio), power delivered to, 205
Capacity, basis of social well-being, 114, 127
Capital, as a factor in production, 95–97, 99–100, 102, 104, 109–110, 113, 115, 182, 318; function of, 278; method of accumulating, 129; stages in accumulation, 130–132; due to exploitation, 103–104, 111, 115, 118, 134; reduces exploitation, 145–147; conservation of, 121; misdirected, 355; of corporations, 153; of mines, 202; amalgamated with resources, 132–133
Carver, Thomas N., "Conservation of Human Resources," 275–361; *Social Justice*, 279, 332
Cash reserves, and credit, 149–150
Cattle, relation to conservation, 31
Cawadias, A., "La Paludisme dans l'histoire de l'ancienne Grèce," 79
Cement, as a by-product, 223–224
Century dictionary, cited, 27
Chadwick, cited, 281
Chamber of Commerce of the United States of America, 249, 271
Chance, H. W., discusses conservation, 195, 271; cited, 196
Chautauqua Institute, services for conservation, 16–17
Chemical fire extinguishers, 88
Chemists, employed by manufacturers, 83
Chicago, World's Fair at, 11; coal market, 203, 248
China, soil conservation in, 6; theft of crops in, 321

Civic responsibility, education for, 151
Civilization, definition of, 277; difference of ancient and modern, 280
Classification of natural resources, as conservation method, 168–169
Clayton Act, and mineral resources, 257
Climate, as a social factor, 112
Coining metals, economy of, 324–325
College professors, and pensions, 298–301
Coal, exhaustion of, 23, 143; conservation of, 112, 128, 142, 155, 189, 191–209, 248; public interest in, 173; profits, 252; government ownership of, 260, 263; demand for, 245; anthracite monopolized, 157, 265; concentration of control of, 247; substitutes for, 206
Coke, methods of producing, 205
Colonization, in California, 63–64; as remedy for over-population, 124
Colorado, doctrine of water rights, 170–171
Columbia University, alumni loyalty, 89; *Studies*, 219, 272
Commissions, value of, 68–69; valuation by, 175–176
Compensatory nature of wages and interest, 115; of productive factors, 109–111
Competition, level of, 42; and social efforts, 42, 315–319; induces waste, 247, 249
Competitive bargaining, and conservation, 316–319, 342, 345, 351–353
Compound interest, and conservation, 135, 137
Compulsion, as a regulative method, 167
Concentration of control, favors conservation, 201, 224, 229, 242, 246–248, 265–267
Concentration of ownership, favors conservation, 218–221
Conduct, standardizing of, 324–328
Confidence, as a source of economy, 320–323, 360
Congress, and conservation, 166; fixes standards, 328
Conservation, defined, 3–10, 97, 126, 276; purpose of, 96–97, 111, 116, 127; in economic stages, 117–125; a government function, 162
Contagion, controlled by public authority, 50
Contracts, for land-selling, 64
Consumption, relation to waste, 39–46, 295; excessive, 122–125; and competition, 315; rational forms of, 356–359
Convertible assets, of borrower, 147–148; of corporations, 152
Coöperation, a step to conservation, 202–203, 209, 232, 234, 248, 257, 268; agencies for, 242; among farmers, 318, 322
Copper, conservation of, 36, 143, 188, 227–232; high prices for, 83; growing demand, 245; monopoly in, 266–267
Corporations, relation to conservation, 152–161
Correlation of conservation agencies, 179
Cosmopolitanism, as a social philosophy, 97–98
Cotton Futures Act, 328
Credit, periods and conservation, 148–149; system for conservation, 160; of government, 259, 261

Crops, storage of, 276
Crystal Falls (Mich.), iron ores of, 211
Cushing, George H., cited, 260
Cuyuna iron range, 215
Cycle, in soil conservation, 6

D

Dairying, as intensive farming, 31–32
Decadence of people, due to lack of conservation, 77–81
Deficiency, the cause of public care, 49
Deforestation, as cause of decadence, 77–80; due to ignorance, 146
Democracy, must control private interest, 164
Denmark, rural credits in, 65–66; coöperation in, 307
Disproportionate consumption as relative waste, 40–41, 125
Distribution, and conservation, 6, 207; unevenness in, 124–125; of talent, 301–303, 311–313
Donations to railways, 177
Drunkenness, and wastefulness, 329–330
Dry farming, land suitable for, 54
Ducktown (Tenn.), copper ore in, 230
Dunlop, J. L., "Secondary Metals," 82–85

E

Eckel, E. C., *Iron Ores*, 271
Economic evolution, relation to conservation, vii–viii, 95–147, 165
Economic independence, and industrial maturity, 105
Economic principles of conservation, 27–46, 111–112
Economic theory, related to conservation, vii, 3–91; related to human energy, 275–276
Economists, as conservationists, 188
Edison, Thomas A., productive power, 291
Education, related to conservation, 38–39, 43, 48–53, 119, 142, 145, 159–160, 167, 171, 179, 187, 241–242; gratuitous, 89; for civic responsibility, 151; in iron regions, 222; theory of, 310–312
Efficiency, improvements of, 223, 230; in production, 351, 356
Eggs, waste by breakage, 86
Egypt, malaria in, 79; human exploitation in, 109
Ely, R. T., *Property and Contract*, 6, 45; *Introduction to Political Economy*, 16; "Conservation and Economic Theory," 3–69
Engel, Dr. Ernest, cited, 49–50
Eminent domain, and private property, 175
Emmons, W. H., "Conservation of Copper," 228–229, 271
Engineers, as conservationists, 188, 235
England, economic theory in, 12–14, 72–74, 249; productive powers in, 76; coal supply, 194, 272; iron ores, 212; laborers, 281
Enlightenment, as a regulative method, 167, 171. See also Education.
Environment, adaptability to, 96
Equality of opportunity, and conservation, 147
Exemptions, as a conservation control, 174

Experts, advise conservation, 142; management of, 152–154
Exploitation, of natural resources, 100–102, 107, 165; conservation and, 118; weakens economic growth, 106; must not always be forbidden, 108; reduced by capital, 145–146; stimulated by taxation, 173; by corporations, 156–157
Export tax, on coal, 204

F

Fair value, principles of, 176
Federal board, for correlation of conservation work, 179
Federal Farm Loan Act, 65
Federal Reserve system, advantages, 150
Federal Trades Commission, 202, 209, 225, 242, 248, 251
Fee owners. See Leases.
Fernow, B. E., services for conservation, 17–18, 20–24, 85; *Economics of Forestry*, 86; "The Practicability of an American Forest Administration," 15; "The Providential Functions of Government with special reference to Natural Resources," 17; cited, 21–24
Fifth Amendment, to United States Constitution, 175
Finance and conservation, 147–153, 178–184; stability of, 320–321
Fires, in forests, 4; checked by public authority, 43; prevention of, 87–89
Fisher, Irving, *The Rate of Interest*, 129
Fisheries, impairment of, 122; conservation of, 169
Fleishhacker, Mortimer, California land commissioner, 64
Food, waste in use of, 38–39, 86–87; disproportionate consumption of, 40
Forestry, importance of, 7–8, 20; monographs on, 15–17; and conservation, 19–24, 59–60, 123
Forests, depletion of, 3, 12, 101, 122; fires in, 4; reconstruction of, 4–5, 85; in Germany, 14, 123; withdrawn from public entry, 20; and public ownership, 44, 46, 59, 169; taxation of, 173
Forethought, as a basis of civilization, 278–279. See also Futurity.
France, economic theory in, 12; little food waste, 86; land problems, 166; industrial opportunity, 180; and Prussian indemnity, 181
Franchises, controlled for conservation, 7; amortization fund for, 176–177
Frankfort on the Main, dairying in, 32
Freedom of contract, and public control, 116, 121
Freehold, justification of, 57
Funding, in reclamation problems, 147, 150; superior capacity of corporations for, 152
Fur-bearing animals, exploited, 101, 103
Futurity, conflict with present, 33–35, 39, 187; relation to desirability, 129, 132–133; relation to conservation, 135–139, 141–161, 236, 276; basis of civilization, 277–278; public interest not dependent on, 182. See also Interest and Investment.

G

Galton, Francis, cited, 280–281
Game, preservation of, 14, 23
Garbage, relation to waste, 38–39
Gas engines, substituted for steam, 205
General Electric Companies, control water-powers, 159
Geologists, as conservationists, 188
Germany, conservation in, 11–12, 14, 17, 19, 113, 123, 166; war conditions, 37; mining control, 61; rural credits, 65–66; productive power of, 74; remedy for over-population, 124; industrial opportunity in, 180; iron ores in, 212; coöperation in, 307; universities of, 13, 19
Glass, manufacture, 302
Gold, as a standard of value, 325
Governors, Conference of, 26
Government, functions of, 163–165; cost of, 180. See also Public control, Interest, etc.
Gradational methods, of mineral taxation, 252–254
Grain Standards Act, 328
Gratification versus saving, 128–130, 132, 136. See also Futurity.
Gray, F. W., *The Conservation of Coal*, 196, 271
Gray, Prof. L. C., "Economic Possibilities of Conservation," 34, 85, 187, 271
Greece, decadence of, 77–81

H

Haas, Frank, *The Conservation of Coal through the Employment of Better Methods of Mining*, 195, 271; cited, 197
Harper, Dr. Cornelius A., health officer, 91
Harvard University, alumni loyalty, 89; theory of education, 310
Harvesting, waste in, 86
Health, need of conserving, 49–51
Heidelberg University, studies at, 17
Hematite ores, of Mesabi, 244
Hess, Ralph H., "Conservation and Economic Evolution," 95–182
Hoarding, as opposed to conservation, 158
Holland, coöperation in, 307
Homesteads, quality of land in, 57
Hough, Franklin B., services for conservation, 20
Housing conditions, in iron mines, 221
Hotel rates, 342–343
Houston, D. F., "The Food Situation of the Country," 86–87
Human resources, and conservation, viii, 30, 33, 42–43, 48–53, 121, 196, 200; relation to natural resources, 47–48, 108–109; conservation of, 275–361
Humid regions, types of land in, 54

I

Idleness, as a source of waste, 282–307, 360
Ignorance, as a source of waste, 308–319
Illinois, forest exhaustion in, 122; mining methods, 198; coal in, 203
Immigration, supplies labor, 103, 107; policies of, 105, 108, 112
Income, sources of, 129; excess of, 134
Incompetence, cult of, 331
Increment of conservation, 136, 139; acquired, 128, 132; mini-

mum of, 136; in private holdings, 141
Indiana farmer, story of, 288–292
Indispensability, as a test of greatness, 312–313
Individualism, as a social philosophy, 97–98, 118; among Anglo-Saxons, 116; absolutism of, 136; relation to conservation, 136–139
Industrial commission, in Wisconsin, 69
Industrial development, relation to conservation, 95–125, 134; periods of, 100, 102–104, 107; periods overlap, 107–108
Industrial eras, defined, 95; classified, 99–100; conservation during, 117–125
Industrial evolution. See Industrial development.
Industrial maturity, period of, 100, 104–105, 107, 111–112; conservation during, 121, 134
Industrial opportunity, and government finance, 180
Industrial perpetuity, importance of, 119–120
Industrial regression, period of, 100, 105–108; conservation during, 121–125
Inherited wealth, waste in, 303–304, 360
Initiative, related to conservation, 140–153, 206, 258; stimulated by government, 164
Inspection of mines, 222–223; versus standardization, 325–326
Intensive use of land, 30–32, 82, 110; not conservative of human resources, 318–319
Interest, theory of, 129–133, 181; variation of rates, 146; equalization of rates, 150, 250–252; not applicable to public investment, 180–181, 261; relation to conservation, 36, 115, 129, 208, 215, 235–250, 243. See also Investment.
International Geological Congress, 191, 271
Interstate Commerce Commission, 257
Inundations, danger of, 4
Inventors, benefit society, 348; rewards, 349–350
Investment theory and conservation, 126–139, 180–181, 208; and human resources, 336–355. See also Interest.
Investor, importance of, 336–356
Ionian Islands, present condition, 79
Ireland, conditions in, 37, 166, 307; rural credits, 65–66
Iron ore, conservation of, 33, 142–143, 188, 210–226; low grades of, 235–240; growing demand for, 245; competition for, 266
Iron River (Mich.), ore on, 211
Irrigation, and public control, 9, 169, 173; land suitable for, 54; priority in, 10, 70–72; experiments in, 147; and private enterprise, 149; beneficial use in, 170–171; and conservation, 337–343
Italy, decadence of, 77, 80; human exploitation in, 109

J

James, E. J., work for conservation, 15
Japan, soil conservation in, 6; pressure of population in, 124
Jones, Richard, English economist, 12
Journal of Political Economy, 86, 159

K

Knies, Karl, acknowledgments to, 17; lectures, 19

L

Labor, as a factor in production, 95–97, 99–100, 102–104, 109–110, 113, 115, 302–303, 316, 344–345; distribution of, 285–287, 335, 345; increase of, 118; improvement of conditions of, 200–201, 208, 220–221, 245; unemployment of, 282–287; cheap, in agriculture, 317–318. See also Wages.

Laissez-faire doctrine, 144

Lake Superior, iron ore regions, 210, 213–218, 236–239, 252, 255–256; copper ore, 230

Land policy and conservation, vii, 29–30, 44, 53–54, 142, 173; classifications of, 54–57; unearned increment of, 158; intensive use of, 318–319. See also Natural Resources and Public Domain.

Lawlessness, waste caused by, 304–305

Lawyers, waste in efforts of, 305–306

Lead foil, wasted, 84

Leases, related to public control, 8–9, 170; of iron properties, 213, 215–219. See also Royalties.

Legislation, for mining, 201–203; and stability, 320; as protection to investors, 355; for development of human energy, 361

Leisure class, and conservation, 287–298

Leith, Charles K., "Conservation of Mineral Resources," 186–272; "Iron Ore Reserves of Michigan in 1911," 210, 272; "Iron Ore Reserves of the World," 212, 272; "Notes on the Conservation of Lake Superior Iron Ores," 237–240, 272

Lesher, C. E., "The Cost of Coal," 199–200, 202–203, 260, 272

Liebig, J., natural scientist, 12

Lindgren, Waldemar, "Resources of the United States in Gold, Silver, Copper, Lead and Zinc," 227, 272

Liquor, as waste food, 39, 329–331

List, Friedrich, advocated conservation, 12, 72–77, 114; *National System of Political Economy*, 72–73, 77, 114

Litigation, waste in, 305–306

Lloyd, Sampson S., translator, 73, 77, 114

Locomotive fire apparatus, 88

Lumber, conservation of, 156. See also Forests and Forestry.

Luxury, and conservation, 358–359

M

McCulloch, John R., English economist, 74

McGee, Dr. W. J., services for conservation, 26; *Agricultural Duty of Water*, 26.

Machinery, replaces farm labor, 32

Malaria, as cause of decadence, 77, 79

Malthus, Thomas R., English economist, 14; theory of population, 113, 123

Manganese, in iron ore, 224

Manufactures, developed by tariffs, 73; uses of metals for, 83–84

Marginal productivity, 338–340

Market-gardeners, and marauders, 321

Marketing, waste in, 86

Marquette (Mich.), iron ore at, 238
Massachusetts school for the feeble-minded, 286
Material interests compared with spiritual, 295–296
Maximum annual output, 104–105
Mead, Elwood, California land commissioner, 29, 64; commended, 67; *The Economics of Irrigation*, 72
Mechanical appliances, in saving human energy, 280–281
Medicine, a public concern, 50, 89–91
Menominee River, iron ore, 210–211
Mesabi range, iron mining in, 33, 216, 238, 244
Metals, secondary savings, 82–84; deposits of, 228; recovery of old, 231
Metallurgic improvements, 230
Mexico, peons in, 264
Michaelangelo, as a type of genius, 291, 295
Michigan, iron ore in, 210–211, 251, 255; State Tax Commission, 251
Middlemen, profits of, 205
Military defense, relation to public ownership, 58, 267–268; taxation for, 183
Military training, advantages, 52, 53, 304–305
Mill, John Stuart, teachings, 118
Mineral Resources of the United States, 82
Minerals, conservation of, viii, 7, 12, 14, 60–62, 142, 169, 186–272, 235; nationalization of, 173; exhaustible, 85, 122; exploited, 101, 122; taxation of, 252–256; and monopolies, 265–267
Mining, improved methods of, 205, 206, 213, 228–229, 242–246, 252, 269; of coal, 195–200; speculation in, 250; under private operation, 61, 102, 235; assessment work, 170; conservation in, 33, 41, 55, 241. See also the several minerals.
Minnesota, iron mining in, 33, 215; State Forestry Association, 20
Mismanagement of resources, 122, 123
Mississippi Valley, erosion in, 4
Monks, services to civilization, 306
Monopolies, of natural resources, 133, 144; and corporations, 152, 155–161; dangers of, 247, 265–267; productions of, 351–352
Moral education, needs for, 52–53; issue in conservation, 70; purpose of, 309
Moral qualities, economic value of, 275–278, 322–323, 360–361
Morgan, David N., California land commissioner, 64
Mosquito (Anophele), as cause of decadence, 79
Munich (Germany), University of, 12
Mussey, H. R., *Combination in the Mining Industry*, 219, 272

N

National Academy of Sciences, founded, 20
National Conservation Commission, 191, 194; *Report*, 272
National Forestry Association, 20
National Lumber Manufacturers' Association, 203, 249, 272
Nationalism, as a social philosophy, 97–98
Natural gas, speculation in, 107; exhaustion of, 122; uses of, 206
Natural monopolies. See Monopolies.

Natural resources, classifications of, 23, 35, 53–57, 85, 117; as factors in production, 95–97, 99–100, 110, 115; relation to population, 108–109, 111–112; relation to capital, 132–133; private ownership of, 141–164; policy of conserving, 58–69, 129–139; relation to human resources, 47–48, 108, 275–361. See also Land, the several minerals, and Water.
Navy, need for oil in, 58–59
Negro, availability for tenancy, 58
New England, human resources of, 48, 275–276; soil-exhaustion in, 122; apple-grading law, 328
New York City, shore lands in, 62; City and Suburban Homes Company, 30
New Zealand, limitation of private ownership in, 57; mining policy, 61; rural credits in, 66; conservation policies, 166
Newell, F. H., *Irrigation*, cited, 70–72
Nietzsche, Frederick, cited, 332
Non-resident tuition, in University of Wisconsin, 89

O

Occupation distribution of labor, 286
Oil, restricted use, 156; refining process, 157; exhaustion of, 122, 143
Oil-bearing lands, and public ownership, 58–59, 173; speculation in, 107; conservation on, 142; monopoly in, 267
Oil flotation process, in copper ores, 230
Oklahoma, coal in, 260
Old age pensions, 299–301
Ontario, recreation land in, 56; shore lands publicly owned, 62
Oranges, standardized, 327
Oregon, water-power policy, 173
Organization, the basis of civilization, 278
Overcapitalization, limitation of, 250
Over-exploitation, danger of, 107
Over supply of labor, 283–286
Oyster farming, and public control, 8–9

P

Pan-American Scientific Congress, viii, 195, 228
Paper, waste of, 83–84
Patten, Simon N., work for conservation, 15
Peat, utilization of, 206
Pennsylvania Railroad "System," 87–89; re-use of metals, 84
Pennsylvania State Forestry Association, 21
Pensions, waste in system of, 298–301
Peons, of Mexico, 296
Permanency, in economic institutions, 104–106
Personnel, of officials, 121
Petroleum. See Oil.
Philosophy, relation to social control, 97–98
Physical order, in industrial evolution, 98
Phosphates, need of, 5
Phosporus, in iron ores, 217, 223
Pinchot, Gifford, services for conservation, 21, 26; cited, 11, 25, 33, 70; "Forestry Abroad," 15; *The Fight for Conservation*, 70
Pioneer life, and economic policy, 118–119
Pittsburgh, as a coal market, 203

Plutarch, cited, 78
Police power, doctrine of, 45–46; need for, 116; in conservation, 172–173
Political expediency and conservation, 97–98
Political organization, need for higher character of, 68
Political Science Quarterly, 80–81
Population, density related to natural resources, 95–96, 98, 108, 112, 118, 146; and means of subsistence, 105–106; distribution of, 112; over-increase of, 122–124
Porphyry group, of copper ores, 230, 246
Potash, as a by-product, 224
Potatoes, waste in cooking, 87
Poverty, causes, 313–314, 319
Powder, excessive use in mining, 197–198
Powell, Maj. J. W., services for conservation, 26; geological expert, 54
Power made from coal, 205
Predatory action should be restrained, 332–335
Preparedness, importance of, vii
Prices, and conservation, 30–32, 82, 143, 174; raised by monopoly, 156, 173–174; controlled by law, 209, 242; arbitrarily increased, 225, 245; affected by standardization, 326–328; of coal, 204
Priests, waste in services of, 306–307
Priority, law of, 10, 70–72; in water powers, 171
Private initiative. See Initiative.
Private property, and conservation, 43–46, 57, 60–61, 115–116, 118–119, 126–127, 141–153, 168–169, 189; defense of, 113; a public trust, 171; returned to public ownership, 175–178
"Proceedings of a Conference of Governors in the White-House," 26
Production, factors of, 109; as a basis of prosperity, 95, 104; definition of, 315–316; opposed to predation, 332–335; relation to competition, 315–319; to conservation, 6, 27–28, 72; to the investor, 336–337, 353–355
Productive power, as source of wealth, 73–77, 114; as an ideal, 289–296
Profits of middlemen, excessive, 205; of iron ore, 237–240; of mining industries, 250–252, 254; of agricultural labor, 317
Prohibition movement, growth of, 330
Promoters, future estimates of, 148
Property, related to conservation, 3, 6–10, 43–46, 113, 116; rights of, 314–315, 360. See also Private Property.
Prosperity, foundations in conservation, vii; relation to production, 95, 104; relation to capacity, 114; stimulates population, 123
Protective tariff. See Tariffs.
Prussia, indemnity from France, 181
Psychological order, in industrial evolution, 98–99
Public budget, increased by conservation, 121
Public concern, and hygiene, 49–51
Public control, of franchises, 7; of land policies, 63; of natural resources, 120–121, 125, 149, 162–184, 235–240, 268–270; of mining, 202, 207–209, 232, 241–270. See

also Public ownership and Social control.
Public cost of reclamation, 122
Public domain, exploitation of, 100; policy concerning, 8–10, 113, 167–168. See also Land.
Public equity, in unearned increment, 177
Public interests, opposed to private, 37–39, 41, 115–116, 127, 149, 162, 167, 224; no time preference in, 141; relation to corporations, 154–161; paramount to private, 171; relation to private, 207–208, 231, 234, 268; division of responsibility, 283–240
Public ownership, compared with private property, 44–46, 56–58, 141, 168, 178; relation to military needs, 58–59; of coal lands, 203, 209; of forests, 4, 8, 44, 46, 58; of minerals, 60–62; of ores, 225; of shore lands, 62; of various natural resources, 120, 159, 243, 257–265, 269. See also Public control.
Public spirit, advances conservation, 151. See also Social Welfare.
Public utilities, and the police power, 172

Q

Quality, as a basis of land classification, 57; standards of, 325–326
Quantitative variation in elements of production, 96, 99, 111–112, 125; industrial capacity, 128
Quarterly Journal of Economics, 34, 85, 187, 271, 324
Quick profits, in new communities, 100

R

Rags, waste of, 83–84
Railroad Commission, in Wisconsin 69
Railways, and public ownership, 44; re-use of metals, 84; rates and artificial development, 112; government regulation of, 163; donations to, 177
Ray, John, *Sociological Theory of Capital*, 129
Raymond, Daniel, *Thoughts on Political Economy*, 114
Reasonable use, as a condition of ownership, 170–171
Reclamation, needs of, 120, 122–124; in United States, 9–10, 72; disastrous experiments in, 147; and government aid, 149
Referendum on coöperation, 249
Reforestation, processes, 4, 80
Regnault, Dr. Felix, cited, 77–80
Regularities, principle of, 42–43
Regulation. See Public Control.
Religious education, needs for, 53, 361
Rent, relation to conservation, 32, 113
Reservoirs, to prevent erosion, 4
Resource taxation, as a principle, 119, 174
Resources. See Natural Resources.
Retail methods, improvement of, 327
Retirement from active life, 287–288, 292–298
Ricardo, David, English economist, 14, 113
Rocky Mountains, placer mines exhausted, 122
Rome, decadence of, 77–81

Roosevelt, Theodore, and conservation, 25–26, 166
Ross, Prof. E. A., *The Changing Chinese*, 321
Ross, Maj. Ronald, theory of malaria, 79
Rowell, Chester, California land commissioner, 64
Royalties, for public domain, 170; for coal owners, 203; for iron ore owners, 213, 215, 224, 240, 256; elimination of, 243, 258–259; not excessive, 260
Rubber, waste of, 83–84

S

Salt monopoly, in England, 249
Say, Jean Baptiste, cited, 12, 74, 76; *Economie Politique Practique*, 76
Scarcity, with relation to resources, 85; related to land values, 82; related to production, 109–110; a cause of private gain, 127, 173
Science, cited, 199, 272
Scientific knowledge, as a basis of civilization, 278–279
Secondary metals, defined, 82–83
Sectionalism, as a social philosophy, 97–98
Self-interest, as aid to conservation, 142–146, 160, 189, 200, 207, 218, 241, 268; insufficient motive, 162; prompts welfare work, 222
Sherman Act, and mineral resources, 257
Shore land, public ownership of, 62
Simkhovitch, Dr. Vladimir, "Rome's Fall Considered," 80–81; "Hay and History," 81
Slavery, effect on productive values, 75
Smelting, methods of, 205, 224, 231
Smith, Adam, position of, 14, 118; criticism of, 73–74; *Wealth of Nations*, 118
Smith, George O., discusses conservation, 195; cited, 199–200, 202–203; "The Public Interest in Mineral Resources," 227, 234, 260, 272
Smithsonian Institution, 77
Smoke consumers, 205
Social control, machinery of, 99, 163; and conservation, 116. See also Public Control.
Social insurance, and conservation, 53
Social saturation, period of, 104–105
Social solidarity, theory of, 22
Social surplus, in mining industries, 251
Social thrift, need for, 104, 141
Social values, in conservation policies, 96–98, 111–112, 115–116, 117, 119, 131, 136, 144, 169; and productive power, 113–114; and ignorance, 314–315
Social welfare, among iron miners, 220–222
Socialism, studies in, 279
Society for the Study of National Economy, proposed, 15
Soil, erosion of, 3–5, 12; reconstitution of, 5, 7; deterioration as cause of national decadence, 78–81; depletion of, 101, 122, 128, 146; chemistry of, 284–285
Spain, contrasted with England, 76; decadence of, 77, 80; human exploitation in, 109; irrigating competition, 342
Specialization, advantages of, 288–289, 326
Speculation, relation to exploitation, 101–102, 106, 276; restric-

tion of necessary, 119, 146; by hoarding, 158; restrained by taxation, 173
Spiritual, qualities, as human resources, 48; interests compared to material, 295–296
Standard of living, and conservation, 359
Standard Oil Company, 267
Standardization, of goods and conduct, 324–328
State, German idea of, 13, 19; American economists' idea of, 15, 16, 36; functions of, 41–43, 116. See also Government and Public control and Public ownership.
Steam, generated by electricity, 205
Steel, new processes in, 223; growing demand for, 245; monopoly in, 157
Stone and Webster, control water-powers, 159
Sugar trust, methods, 70
Substitution in factors of production, 109–110, 115
Sulphuric acid, as a by-product, 230
Superior (Wis.), waste urban land in, 63
Supervision, of development credit, 150–151
Surplus, necessary to development, 103, 130; effective for conservation, 137

T

Talent, distribution of, 301–303, 311
Tariffs, and arbitrary price fixing, 245; develop manufactures, 72–73
Taxation of mineral resources, 61, 242, 253–256; of increased profits, 156, 252–253; as a conservation method, 172–174, 183; in financing public projects, 178, 181–184, 261–262
Technical skill, training for, 303, 312, 335
Tenancy, importance of, 58; and alien ownership, 67
Tenements, improvements in, 30
The Foundry, 84
Thompson, John G., "The Nature of Demand for Agricultural Products and Some Important Consequences," 86
Thrift, induced by taxation, 181
Timber. See Forests.
Tin foil, wasted, 84
Topography, as a social factor, 112
Toronto University, forestry in, 17
Transportation, of coal, 204–205; favorable situations for, 244. See also Railways.
Trustee, government acts as, 234–235
Trusts, relation to conservation, 42. See also Monopolies.
Turkey, missionary from, 38; human resources few, 48
Twine, waste of, 83–84

U

Unearned increment, of lands, 158; a public equity, 177
Unemployment, and conservation, 282–287
United States, food waste in, 86, 87; land policy of, 57–58; general waste in, 83; pioneer days in, 103; constitution of, 175; reclamation service, 9–10, 72; economic theory in, 14–17, 22
United States, Bureau of Mines, 200, 231

United States, department of Agriculture, 9, 87; secretary, 87; commissioners of, 20; forestry division, 21
United States, Department of the Interior, conservation policies, 166
United States Geographical and Geological Survey of the Rocky Mountain Region, 54
United States Geological Survey, 82, 191, 194, 210, 227, 231, 234, 260, 271, 272
United States Steel Corporation, 220, 266; suit against, 272
Urban land, classification of, 56; waste in, 62–63

V

Valuation of private property for return to public ownership, 175–177; of individual service, 333–353
Value, definitions of, 35, 117; theories of, 74–76; basis of, 309
Van Hise, Charles R., services for conservation, 25–26, 69, 166; "Big Business in relation to industrial Prosperity," 272; *Concentration and Control*, 42, 69, 219, 246; *Conservation of the Natural Resources of the United States*, 19, 26, 166, 194, 272; cited, 20, 36–37; "Coöperation in Industry," 202–203, 249, 272
Vice, as a source of waste, 329–331
Village communities, in middle ages, 81
Vincent, Bishop John H., founder of Chautauqua, 17
Vocational education, relation to culture, 51

W

Wages, related to intensive farming, 32; as compensation for labor, 115; in iron mines, 221; related to the investor, 336–337. See also Labor.
War, needs of country during, 37, 267–268; effect on land policy, 67; effect on prices, 204, 209, 226, 232; waste of, 304–305
Warren, George F., *Farm Management*, 31
Waste, defined, 27–28, 39–46; in food, 86–87; in metals, 83–85; by fires, 87–89; in human energies, 277; a relative term, 110–111, 276; due to idleness, 282–307; to ignorance, 308–319; to priorities, 72; to vice, 329–331
Water, supply unlimited, 85; priority in use of, 10, 70–72; adjusted to needs, 285; lands classified with relation to supply of, 54–55, 85; public ownership of supply, 62
Water powers, public control of, 7, 169, 173, 178; not exhaustible, 85, 143; mismanaged, 122; speculation in, 158–159; as substitute for coal, 206
Waterways, use of, 204
Wealth, causes of, 73–77, 114; exploitation for, 101; distribution of, 113, 124–125, 311–314; conversion into capital, 130; of nations, 182–183; classification of, 303; uses of, 349–350
Webb, H. W., "The Concentration of Water Powers," 159
Weights and measures, standards in, 324–325
Weinstock, Harris, California land commissioner, 64

Welfare work. See Social welfare.
West Point, function of, 13
Wheeling (W. Va.), electric power plant, 205
Wisconsin, commissions, 69; legislature and public medicine, 90–91; water-power policy, 173, 178; State board of health, 90–91
Wisconsin University, conservation in, 16–17; department of political economy, 17; medicinal clinic, 50–52, 89–91; fees, 89; professor, 186
Workingmen's compensation laws, 200, 222

Y

Yale University, alumni loyalty, 89

Z

Zinc, high prices for, 83

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